

Western Australian Audit of Surgical Mortality



Royal Australasian
College of Surgeons

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The information contained in this Annual Report has been prepared by the Royal Australasian College of Surgeons, Western Australian Audit of Surgical Mortality Management Committee. The Australian and New Zealand Audit of Surgical Mortality, including the Western Australian Audit of Surgical Mortality has protection under the Commonwealth Qualified Privilege Scheme under Part VC of the *Health Insurance Act 1973* (Gazetted 6 November 2006).



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CHAIRMAN'S REPORT

There has again been substantial progress in the establishment of the Australian and New Zealand Audit of Surgical Mortality (ANZASM). This will have important implications for all surgeons.

From 1st July 2010 all Australian States and Territories will be contributing to the ANZASM. Thus the College has now established a national audit. Positive discussions with New Zealand continue. The College has invested much time, money and effort into establishing ANZASM. It deserves credit for what it has achieved in only five years. The next step is to ensure full and proper participation. The College cannot afford for ANZASM to now fail. Fellows should anticipate that the College will want to take a firmer line as it seeks to ensure almost complete participation.

The first step to ensure quality is complete data. The College Council has determined that where mortality audits are in place participation will be a compulsory part of its Continuing Professional Development (CPD) programme. As part of this process the College Council is considering the quality standards that should apply. It is likely to set a high standard, not only for the return of a high number of proforma, but also that they are fully completed. In recognition of the work involved ANZASM has requested that there be an increase in CPD points.

Surgeons who do not return complete forms will find they do not meet the standard determined by Council. This will mean they will not achieve CPD status. This has substantial potential implications for their Fellowship, accreditation and any medical legal challenges. Council is of the view that proper participation is a professional obligation and will consider low participation in a poor light.

The next step will be to start data analysis. There is now enough information from individual states for ANZASM to start undertaking an initial national analysis. This will have to commence with caution as data quantity and quality will be variable and there is a great risk that any inter state variation will be interpreted as a difference in practice, whereas any disparity may relate to data quality.

Many previous studies have shown that the surest way to improve data quality is to get it into the public domain. Initial data will be published at a state level in an anonymous form; however, it would be advantageous if states could collaborate so that in areas where there are good outcomes others could learn from their processes.

In the second half of the year ANZASM will provide Fellows with the option of submitting the case record forms and first-line assessments online with a web-based tool called Fellows Interface. The paper-based version submission format will still be available. Many surgeons will have experience of some form of web-based audit through their specialist societies. Surgeons will be advised of deaths notified to the WAASM office by email, and will then be able to access and complete the relevant proforma on-line. This will then be returned to the WAASM office electronically via secure, encrypted means. First-line assessors will also be notified of cases they have to review electronically and will be able to do that online. Second-line reviews, which require the clinical notes, will remain paper based. Security has been central to the development of the website and encryption is at the same level as industry standards.

One major advantage that is built into the web based audit is that when surgeons log on they will automatically be presented with their participation and performance data real time. This will be shown alongside that of their peers for comparative purposes. Real time feed back will be a powerful incentive for participation.



This report, as in previous years, includes a detailed analysis of one aspect of WAASM's data. This year WAASM compared Adverse Events as recorded by the surgeon (on the proforma) with those documented by the assessor (both first and second line). The data shows that assessors record many more Adverse Events than the surgeon. The difference is substantial. Some of these are clear-cut Adverse Events, such as post-operative haemorrhage, yet are not recorded as such by the surgeon. These data strongly emphasizes the importance of peer review.

During the year there have been on going discussions with the WA Health Department (WAHD) regarding WAASM funding. This has now been resolved. Underlying these discussions has been the WAHD's desire to ensure that all surgically related deaths are reviewed in accordance with the WA Review of Mortality (WARM) policy, and in particular that the WAHD has a record that this has occurred. Surgeons have the option to review their deaths through WAASM rather than WARM, but this still needs to be done within three months of death. A major issue over the last 18 months has been how WAASM can give this data to the WAHD without breaching the Commonwealth QP Act. The final legal opinion is that WAASM cannot provide even this limited data set to the WAHD. This is despite WA surgeons indicating they have no objections.

In order to comply with the College CPD requirements WA surgeons will have to complete the WAASM proforma, a detailed process, and either notify the hospital that the death review has occurred within the three month timeframe as stipulated by the WARM policy or undertake a WARM review. Some hospitals may still require surgeons to complete a WARM form, a one page process.

I would like to take this opportunity to thank all surgeons for their participation, particularly our Assessors whose contributions are invaluable. I am also highly indebted to our project office staff for their daily efforts in making the Audit a success.

RJ Aitken



ABBREVIATIONS

ACT	Australian Capital Territory
ANZASM	Australian and New Zealand Audit of Surgical Mortality
ASA	American Society of Anesthesiologists
ASC	Australian Scientific Conference
CPD	Continuing Professional Development
DVT	Deep vein thrombosis
GI	Gastrointestinal
HDU	High dependency unit
ICU	Intensive care unit
IQR	Interquartile range
NCEPOD	National Confidential Enquiry into Patient Outcome and Death
NICE	National Institute of Clinical Excellence
RACS	Royal Australasian College of Surgeons
SASM	Scottish Audit of Surgical Mortality
SPSS	Statistical Package for Social Sciences
TOPAS	The Open Patient Administration System
UWA	University of Western Australia
WAASM	Western Australian Audit of Surgical Mortality
WADH	Western Australian Department of Health
WARM	Western Australian Review of Mortality



EXECUTIVE SUMMARY

Background

WAASM is an external independent peer review of surgical mortality and is funded by the Western Australian Department of Health (WADH) and has protection under federal legislation.

The Western Australian Audit of Surgical Mortality (WAASM) is now in its tenth year, having commenced in June 2001 as a pilot project under the management of the University of Western Australia (UWA). In 2005, the Royal Australasian College of Surgeons took responsibility for oversight of this project. Subsequently the College established the Australian and New Zealand Audit of Surgical Mortality (ANZASM). Similar mortality audits have been established in Tasmania, South Australia, Queensland, Victoria, Australian Capital Territory and Northern Territory.

Audit process and reporting conventions

WAASM is notified of all in-hospital deaths. Cases in which a surgeon was involved in the care of the patient are audited. A structured proforma is sent to the surgeon to complete. Returned forms are de-identified and then peer reviewed by another consultant surgeon (first-line assessment).

From 1 January to 31 December 2009, 598 deaths were reported to WAASM with 80% of proforma being returned.

Surgeon participation

Surgeon participation in WAASM has continued to increase in 2009.

Second-line assessment

The number of second-line assessments (case note reviews) has decreased since 2002, with 6% of cases being referred for second-line review in 2009, down from 23% in 2002. This is largely due to more comprehensive information being provided in the proformas and additional letters and discharge summaries, which are helpful in explaining the rationale underlying the process of care. With this additional information it is often possible to close the WAASM case without further review.

Analysis

This report contains an analysis of cases reported to WAASM from January 2002 to December 2009 that had completed the audit process by 28 February 2010 (n = 3916). Some data is missing due to incomplete information in proformas and where this occurs it is noted in the text.

Comparison of surgeons' and assessors' view of areas of concern and adverse events

As with previous years WAASM has noted that assessors reported almost double the areas of concern or adverse events compared to the level of clinical incidents reported by surgeons.

Patient sample demographics

Of the 3916 cases which have completed the audit process (2002–2009), the median age was 78 years with an inter-quartile range (IQR) of 67–85 years. Neurosurgical patients had a median age of 61 years (IQR 46–75 years) compared to orthopaedic patients who had a median age of 85 years (IQR 80–90 years). Ninety per cent of cases had an American Society of Anesthesiologists (ASA) grade of four or more. The majority of cases (94%) had one or more co-morbidity. The main causes of death in patients aged 70 years or less were multiple organ failure, brain haemorrhage,



septicaemia, malignancy and respiratory failure. The main cause of death in patients aged over 70 years included acute myocardial infarction, septicaemia, multiple organ failure, respiratory failure, pneumonia and malignancy.

Areas for consideration, of concern and adverse events

As with previous years, the percentage of deaths that were associated with preventable areas of concern or adverse events was less than 1%.

RECOMMENDATIONS

Notifications

- Improve hospital data systems to allow accurate tracking of the clinician responsible for an individual patient. This would ensure that a minimal number of cases would be excluded from the report due to incorrect identification of the treating surgeon.

Hospital participation

- Ensuring all current participating private and public hospitals continue to support the WAASM process by sending in notifications of death.

Surgeon participation

- Encourage the participation of all surgeons in the Audit process in light of the recent changes to College CPD effective from January 2010. This means that audit participation would be a requirement for those surgeons working in hospitals where an audit is available. This would require greater completion of surgical case forms to ensure accurate analysis of data.
- The College Professional Standards Committee to review and increase the allocation of CPD points for the completion of both First and Second Line Assessments. This should improve surgeon participation in first and second line assessments.

Surgeon feedback

- Provide individual reports to surgeons annually, including total number of cases, case form completion rates and assessment status.

Clinical management

- Continue to monitor DVT prophylaxis, particularly in relation to reasons for not using prophylaxis during a patient admission.

ICU/HDU

- Continue monitoring ICU/HDU use, to assess whether current bed allocation practices are appropriate.

Reporting

- Participation in the National Surgical Mortality Audit Report
- Develop yearly trend analysis as data becomes available and provide and develop specific recommendations for the WA Department of Health.
- Migration of WAASM data onto the national web-based system facilitating surgeons inputting case forms online.



1 INTRODUCTION

KEY POINTS

- WAASM is an external independent peer-reviewed audit of the process of care associated with all surgically-related deaths in Western Australia.
- This annual report covers the period 1 January 2002 to 31 December 2009, as audited on 28 February 2010.
- WAASM’s main role is to feed back information to inform, educate, facilitate change and improve quality of practice.

1.1 Background

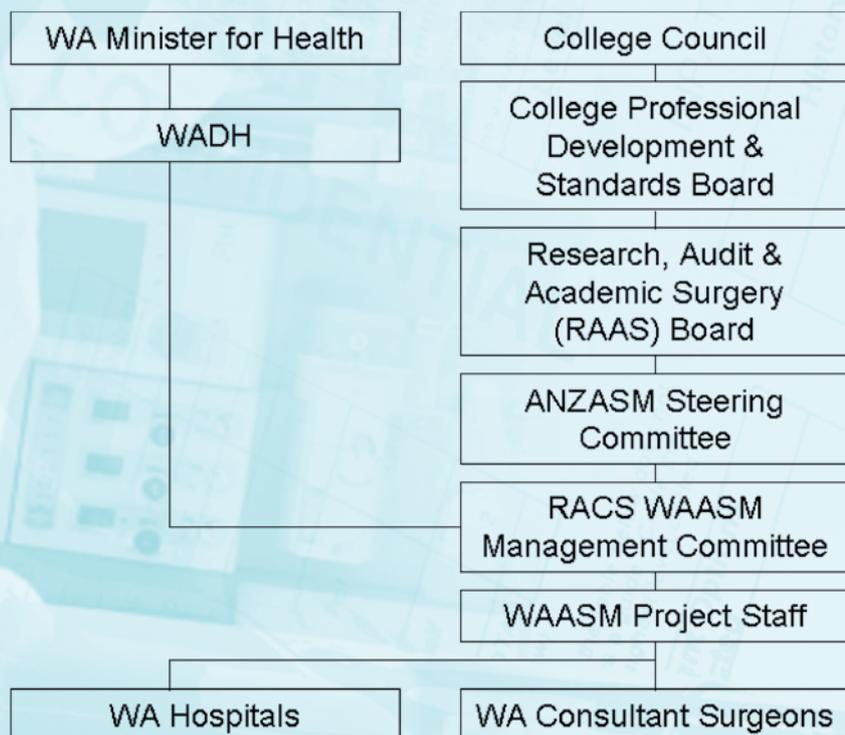
WAASM is an external independent peer-reviewed audit of the process of care associated with all surgically-related deaths in Western Australia.

WAASM commenced in June 2001 as a pilot project under the management of the University of Western Australia. WAASM’s methodology is based on the Scottish Audit of Surgical Mortality (SASM). In 2005, management was transferred to the Royal Australasian College of Surgeons (RACS). Since then the College established the Australian and New Zealand Audit of Surgical Mortality (ANZASM) and has now set up similar mortality audits across all other states and territories.

1.2 Governance

The ANZASM (including WAASM) is protected under the Commonwealth Privilege Scheme under part VC of the *Health Insurance Act 1973* (gazetted 6 November 2006).

Figure 1.1: The structure of the Western Australian Audit of Surgical Mortality (WAASM)





2 THE AUDIT PROCESS

2.1 Methodology

Detailed methodology of the WAASM audit process is contained in the 2003 to 2007 WAASM annual reports⁽¹⁻⁵⁾, which are also available on the College website:- (<http://www.surgeons.org/Content/NavigationMenu/Research/Audit/WAASM/>)

In brief, WAASM is notified of all in-hospital deaths through either The Open Patient Administration System (TOPAS) or directly via medical records departments. All cases in which a surgeon was involved in the care of the patient are included in the audit, whether or not the patient underwent a surgical procedure.

The consultant surgeon associated with the case is sent a structured proforma for completion. The completed proforma is returned to WAASM where it is de-identified and then assessed by a first-line assessor. This will be a different surgeon but of the same specialty ('peer review'). The first-line assessor will either close the review or advise that the case undergo further assessment, i.e. a 'second-line assessment' or 'case note review'.

Cases may be referred for a second-line assessment if:

- areas of concern or adverse events are thought to have occurred during the clinical care of the patient that warrants further investigation
- a report could usefully draw attention to lessons to be learned, either for clinicians involved in the case or as part of a collated assessment (case note review book) for wider distribution.

Second-line assessors are different consultant surgeons from the same specialty as the surgeon associated with the case, but work in a different hospital to that in which the death occurred.

2.2 Providing feedback

One of the main aims of WAASM is to provide feedback to inform, educate, facilitate change and improve practice.

2.3 Reporting conventions

2.3.1 Reporting clinical incidents

In the structured proforma the surgeon is asked to document whether there were any clinical incidents during the care of the patient. The surgeon is asked to:

- report on the impact of the incident on the outcome, that is, whether the incident:
 - made no difference to outcome
 - may have contributed to death
 - caused the death of a patient who would otherwise have been expected to survive



- give their opinion as to whether the incident was preventable, using the following categories:
 - definitely
 - probably
 - probably not
 - definitely not
- indicate who the incident/event was associated with:
 - audited surgical team
 - another clinical team
 - hospital
 - other.

First- and second-line assessors also complete the same assessment matrix.

2.3.2 Analysis of clinical incidents

WAASM primarily focuses upon areas of concern and adverse events. Data regarding areas for consideration are collected, but they are 'less serious events', and have little impact on the overall care of the patient and so they are generally excluded from the analysis because they make no difference to the outcome.

2.4 Data analysis

WAASM audits all deaths occurring in Western Australian hospitals while under the care of a surgeon. However, terminal care cases are excluded from the full audit process. The 2010 annual report covers deaths reported to WAASM from 1 January 2002 to 31 December 2009 censored on 28 February 2010. Due to the time lag some cases are still under review and will be included in the next annual report. Numbers in previous annual reports may vary from this report because some cases are completed after the censor dates of the previous annual reports.

Data is entered and stored in a Microsoft Office Access (2003) database and analysed using the Statistical Package for Social Sciences (SPSS), version 17.0 and Microsoft Office Excel (2003). Numbers in parentheses in the text (n) represent the number of cases analysed. As not all data points were completed, the total number of cases used in the analyses varies. The total numbers of cases included in the analyses are provided for all tables and figures in the report.

2.5 Performance review

Recommendations were included in the 2009 WAASM report.⁽⁷⁾ An important measure of the success of WAASM is whether these recommendations have been addressed or achieved. A list of recommendations and progress against these are listed in Section 5 of this annual report.



3 AUDIT PARTICIPATION & ASSESSMENT

KEY POINTS

- Participation in WAASM is voluntary.
- There has been a decrease in the number of deaths reported from 2008 to 2009. The lowest numbers of surgical deaths were reported in 2009 since 2002.
- The majority of proformas are being returned to the WAASM office.

3.1 Overview of participation

3.1.1 Deaths reported to WAASM

Table 3.1 and Figure 3.1 summarise the data on deaths reported to WAASM from 1 January 2002 to 31 December 2009. Percentage participation is calculated on the completion and return of the proformas by 28 February 2010. The audit process is complete once the proforma has been assessed by the first- and, if required, the second-line assessor.

Table 3.1: Deaths reported to WAASM between 1 January 2002 and 31 December 2009 (audit status as at 28 February 2010)

Year	Number of Cases (%)								
	2002	2003	2004	2005	2006	2007	2008	2009	Total
Total Deaths Reported	672	639	692	713	740	667	681	598	5402
Audit Process Complete	416 (62)	392 (61)	486 (70)	551 (77)	619 (84)	554 (83)	560 (82)	338 (57)	3916 (72)
Proforma Complete, awaiting assessment^a	0 (0)	0 (0)	1 (<1)	0 (0)	7 (1)	17 (3)	77 (13)	224 (66)	326 (8)
Proforma not returned^b	205 (49)	191 (48)	142 (29)	115 (20)	58 (9)	63 (11)	8 (1)	0 (0)	782 (20)
Terminal care cases (excluded)	5 (1)	9 (2)	16 (3)	28 (5)	24 (4)	23 (4)	16 (2)	14 (4)	135 (3)
Closed no information available	4 (<1)	7 (1)	3 (<1)	7 (1)	8 (1)	1 (<1)	4 (<1)	4 (1)	38 (<1)
Cases associated with non-participation^c	47 (11)	49 (12)	60 (12)	40 (7)	48 (8)	32 (5)	32 (5)	32 (9)	340 (8)

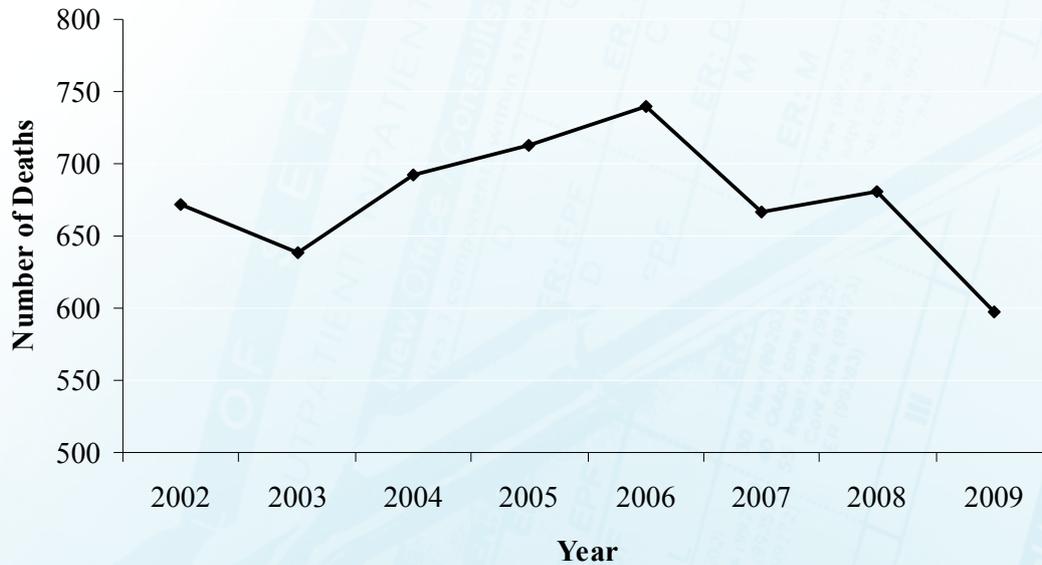
^a Case awaiting first- or second-line assessment

^b Proformas are considered “not returned” if they have not been received by the WAASM office within two years of the notification of death

^c Non-participants are surgeons who have indicated that they do not wish to participate in WAASM



Figure 3.1: Reported number of deaths to WAASM (2002-2009) (n=5402)



Comment

The average number of deaths reported to WAASM is 675 per year. The majority of proformas are returned to the WAASM office. Deaths reported to WAASM have fallen from peak levels of 740 (2006) to 598 (2009), displaying a decrease of 20% of surgical-related deaths from 2006-2009. In addition, there has been a 3% increase in the number of overall cases that have completed the audit process by the censor date (69% in 2009 annual report⁽⁷⁾ vs. 72% in current report).

3.2 Participation in WAASM

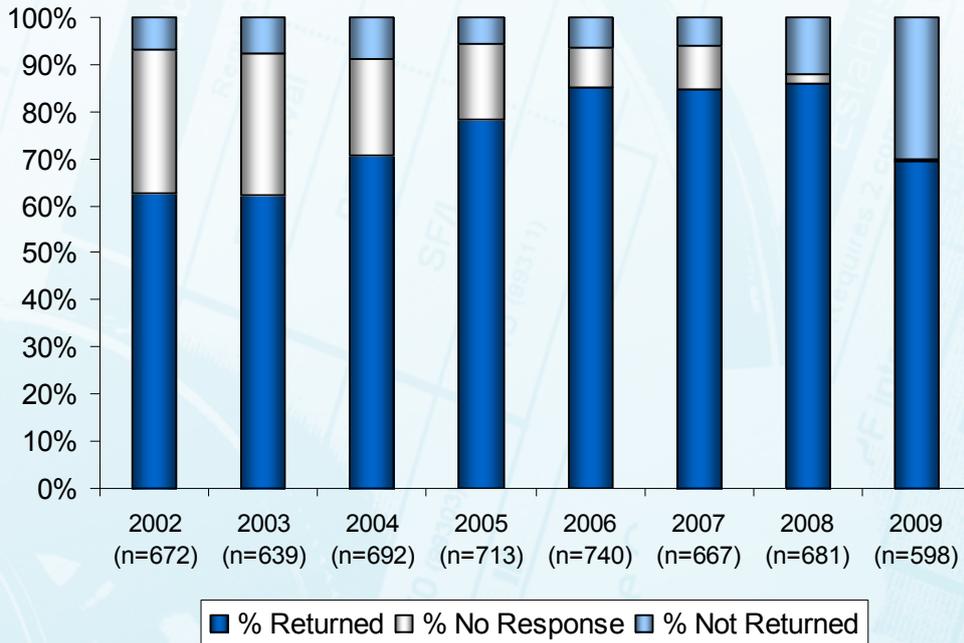
KEY POINTS (Table 3.2)

- The percentage of proformas returned has increased by 22% since 2002 (63% in 2002 vs 85% in 2008).
- Surgeon participation in the audit has continued to increase during 2009.
- Over the total audit period from 2002 to 2009 surgeons 75% of proformas were returned by surgeons overall.

Participation in WAASM from 2002 to 2009 is depicted in Figures 3.2 and 3.3, and Table 3.2.

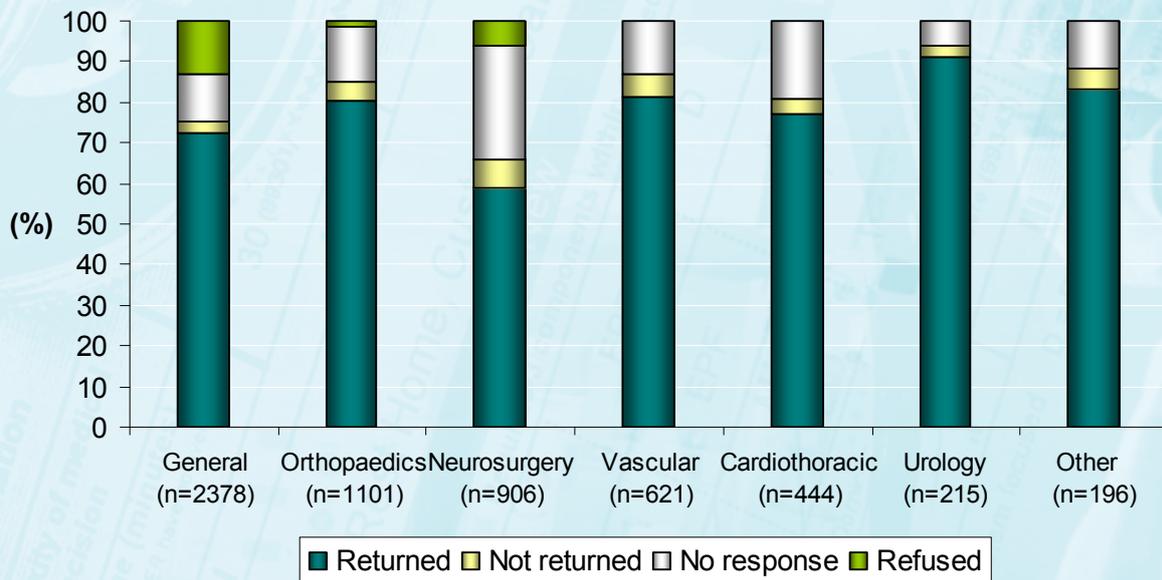


Figure 3.2: Proforma completion rates (2002-2009) (n=5402)



Note: Proformas not returned include cases ‘in progress (not yet returned) and cases associated with ‘non-participants’.

Figure 3.3: Proforma status by specialty (2002-2009) (n=5861)



Note: Other includes obstetrics & gynaecology, otolaryngology & ophthalmology, paediatrics and plastic surgery.



Table 3.2: Surgeon participation

Total Number of Cases (%)									
Year	2002	2003	2004	2005	2006	2007	2008	2009	Total
Reported Deaths	672	639	692	713	740	667	681	598	5402
Surgeons associated with reported deaths	146	139	146	141	147	172	181	151	1223
Proforma Returned ^a	420 (63)	399 (62)	488 (70)	558 (78)	630 (85)	564 (84)	584 (85)	411 (68)	4054 (75)
Case Statistics of Surgeons Associated With Three or More Deaths									
Number of surgeons associated with three or more deaths	81 (55)	76 (55)	75 (51)	78 (55)	82 (56)	85 (49)	78 (43)	74 (49)	629 (51)
Reported deaths related to surgeons associated with three or more deaths	349 (52)	325 (51)	408 (59)	477 (67)	546 (74)	451 (68)	447 (66)	266 (44)	3269 (61)
Number of cases in progress	0 (0)	0 (0)	0 (0)	0 (0)	6 (1)	15 (3)	61 (14)	185 (70)	267 (8)
Number of cases in which forms were not returned ^b	192 (55)	180 (55)	125 (31)	104 (22)	56 (10)	53 (12)	5 (1)	3 (1)	718 (22)
Number of cases associated with non-participants ^c	46 (13)	49 (15)	60 (15)	40 (8)	47 (9)	32 (7)	32 (7)	30 (11)	336 (10)

^a Includes terminal care cases; ^b Consultant no response; ^c Surgeon refused to participate

Comment

Consultant participation has increased by 22% since the inception of WAASM from 63% in 2002 to 85% in 2008 (Figure 3.2; Table 3.2). There was a decrease in the proportion of proformas returned from 85% in 2008 to 68% in 2009. This may be due to the early censor date for 2009 data (28 February 2010 instead of 31 March 2010). Furthermore, the proportion of non-responders has continued to decrease throughout the audit from 30% (2002) to <1% (2009). These results strongly suggest that surgeons and hospital departments are supportive of the WAASM process.

3.3 Hospital participation

KEY POINTS
<ul style="list-style-type: none"> ● All hospitals in Western Australia (public and private) participate in the audit (n=38). ● 80% of audited deaths occurred in public hospitals. ● 74% of audited deaths occurred in three public hospitals. ● 25% of cases had been transferred from one hospital to another.

All 38 hospitals in Western Australia take part in the audit process. Figure 3.4 shows the number of reported deaths of patients admitted for surgery in all 38 hospitals and the proforma status (returned versus not returned) for each hospital.



Figure 3.4: Reported deaths of patients admitted for surgery in 38 hospitals in Western Australia (2002-2009)

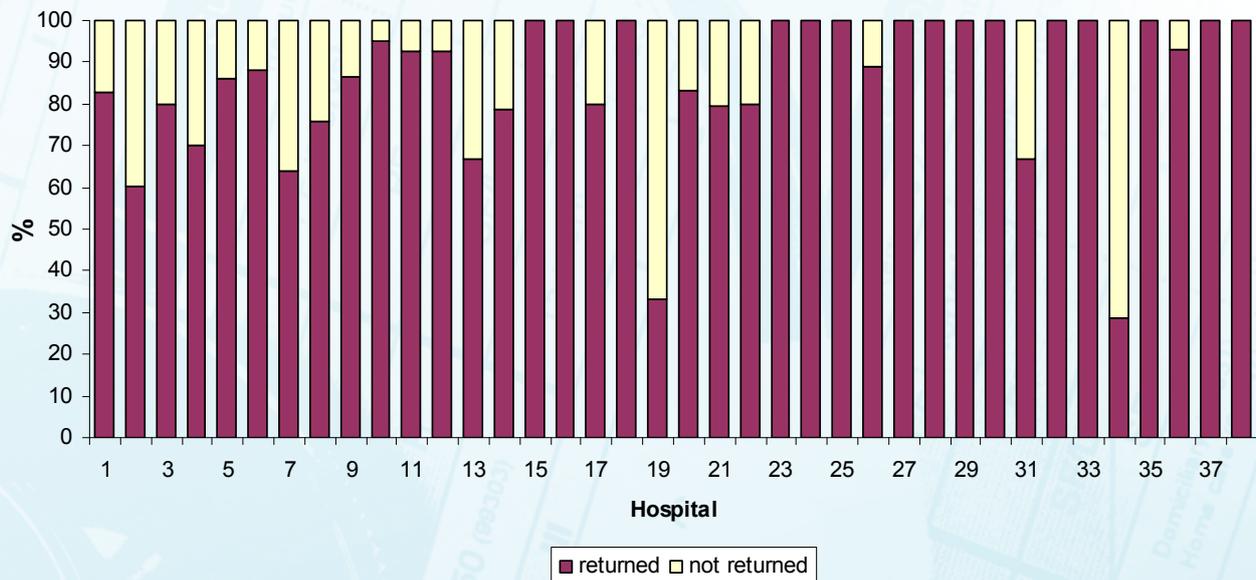


Table 3.3: Cases where the patient was transferred from one hospital to another hospital

Number of Transfer Cases (%)									
Year	2002	2003	2004	2005	2006	2007	2008	2009	Total
Completed Cases^a	402	388	456	460	487	437	467	279	3376
Patients Transferred	93 (23)	104 (27)	110 (24)	107 (23)	130 (27)	105 (24)	123 (26)	70 (25)	842 (25)

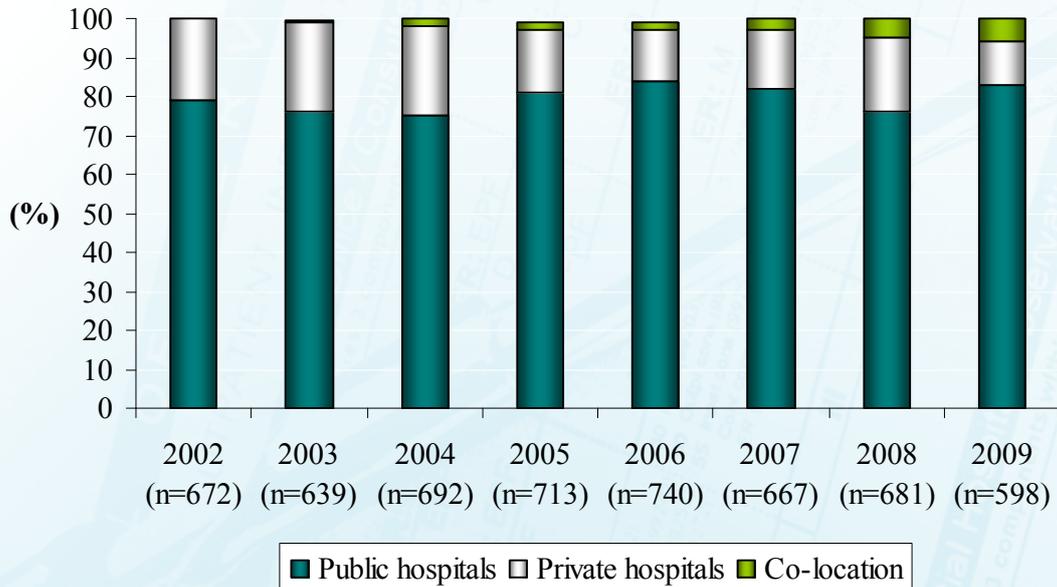
^a This data was computed on completed cases (including terminal care cases). Neurosurgical cases where the question was not on the neurosurgical proforma have been excluded. Numbers of completed cases are reflected in Table 3.1. (Data missing for 540 cases).

Comment

The cases that involve a transfer between hospitals, typically between a regional and metropolitan facility, remained stable between 2002 and 2008. While lower numbers of completed cases and transfers were observed in 2009, the proportion of cases in which a patient was transferred was consistent with the overall trend observed throughout the total audit period (2002-2009). Overall, in 25% of cases a patient was transferred between hospitals.



Figure 3.5: Patients admitted to public or private hospitals in WA (2002–2009) (n=5402)



Note: Co-location refers to a case in which the patient has been in both public and private hospital.

Comment

Eighty per cent of deaths occurred in public hospitals with 74% of deaths occurring in three public hospitals within Western Australia.

3.4 Second-line assessment

KEY POINTS

- Request for second-line assessors remained consistent throughout the audit period.

Table 3.4: Cases referred for second-line assessment

	Number of Cases (%)								Total
	2002	2003	2004	2005	2006	2007	2008	2009	
Completed cases^a and cases with second-line assessment in progress	411	383	470	523	594	531	544	328	3784
Cases referred for second-line assessment	95 (13)	62 (16)	74 (18)	60 (12)	75 (13)	58 (11)	72 (13)	45 (14)	541 (14)
Proforma returned, first-line assessment in progress	0 (0)	0 (0)	0 (0)	0 (0)	6 (1)	6 (1)	13 (2)	24 (7)	49 (1)

^a Terminal care cases were excluded



Figure 3.6: Proportion of cases referred for second-line assessment (2002–2009) (n=541)



Comment

The proportion of cases referred for second-line review has consistently been between 11% and 14% in the last 5 years. The need for a second-line assessment can often be avoided if the consultant completes the WAASM proforma in full and attaches any relevant letters or documentation. WAASM would again like to encourage all surgeons to fully complete the surgical proformas and provide as much additional detail as possible. This is likely to become a requirement of CPD compliance.

4 RESULTS

4.1 Overview and patient sample demographics

KEY POINTS	
●	A total of 3916 cases had completed the audit (2002 – 2009) as of 28 February 2010.
●	54% of cases were male; the median age was 78 years (76 and 81 years for males and females respectively).

As of 28 February 2010 a total of 3916 cases were reported between 1 January 2002 and 31 December 2009 (Table 4.1).

Table 4.1: Completed cases (2002-2009)

Number of Cases									
Year	2002	2003	2004	2005	2006	2007	2008	2009	Total
Audit process complete	416	392	486	551	619	554	560	338	3916



4.1.1 Age and gender distribution

Table 4.2 shows the median age and sex of the audited patients, while figures 4.1 and 4.2 look at the distribution of age by gender. Figure 4.3 reports on age by specialty.

Table 4.2: Median age and gender (2002–2009)

	Number of Cases	Median age (years)	Inter-quartile range (years)
All patients	3916	78	67 – 85
Male (54%)	2104	76	65 – 83
Female (46%)	1812	81	71 – 87

Figure 4.1: Age distribution by gender (2002-2009) (n=3916)

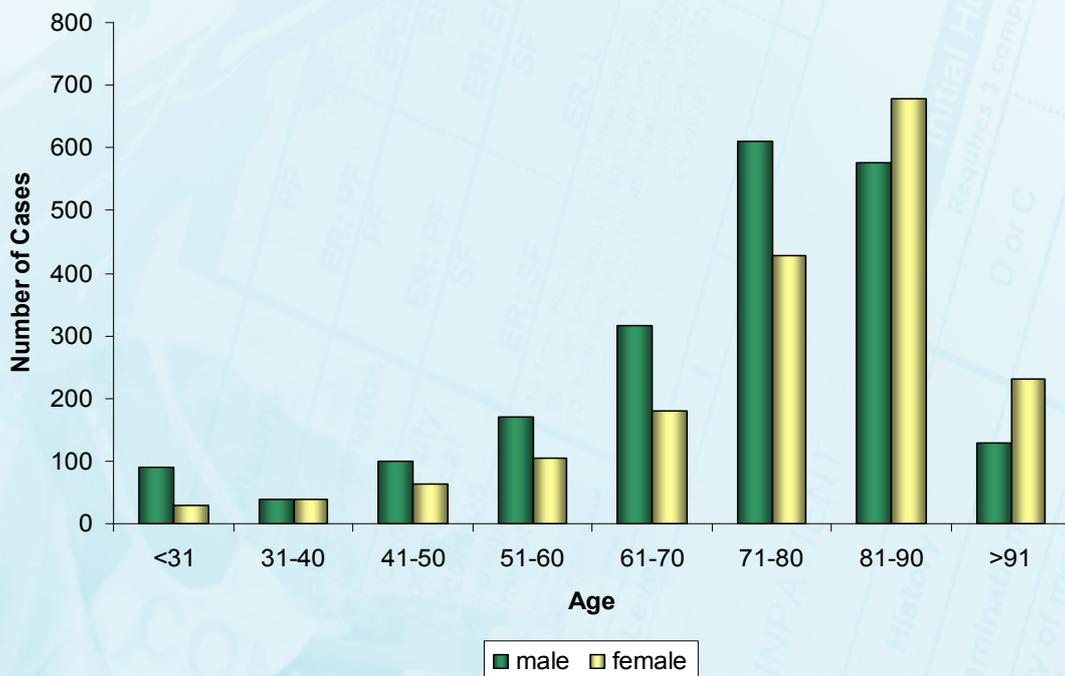


Figure 4.1 shows that the gender trend changes as age increases. Males predominate in the 41-50, 51-60, 61-70 and 71-80 year ranges, whilst females predominate in the 81-90 and >91 year age range. This is likely due to the longer average life expectancy of women.

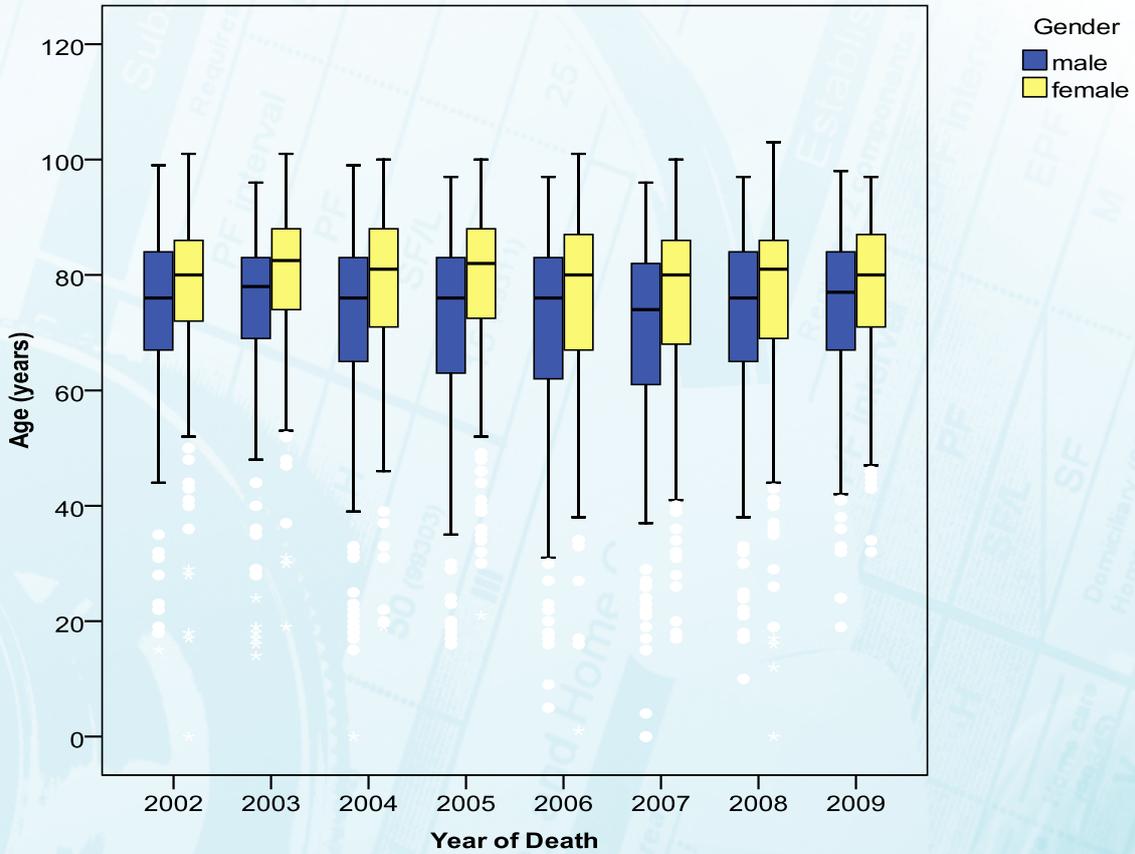
Figures 4.2 and 4.3 are box and whisker plots, in which:

- The central box represents the values from the lower to upper quartile (25-75 percentiles)
- The middle line represents the median value
- The vertical line extends from the minimum value to the maximum value, excluding outliers and extreme values (i.e. values larger than the upper quartile and plus 1.5 or 3 times the inter-quartile range)

Outliers and extreme values can be displayed at separate points, however in figures 4.2 and 4.3 they have been excluded.

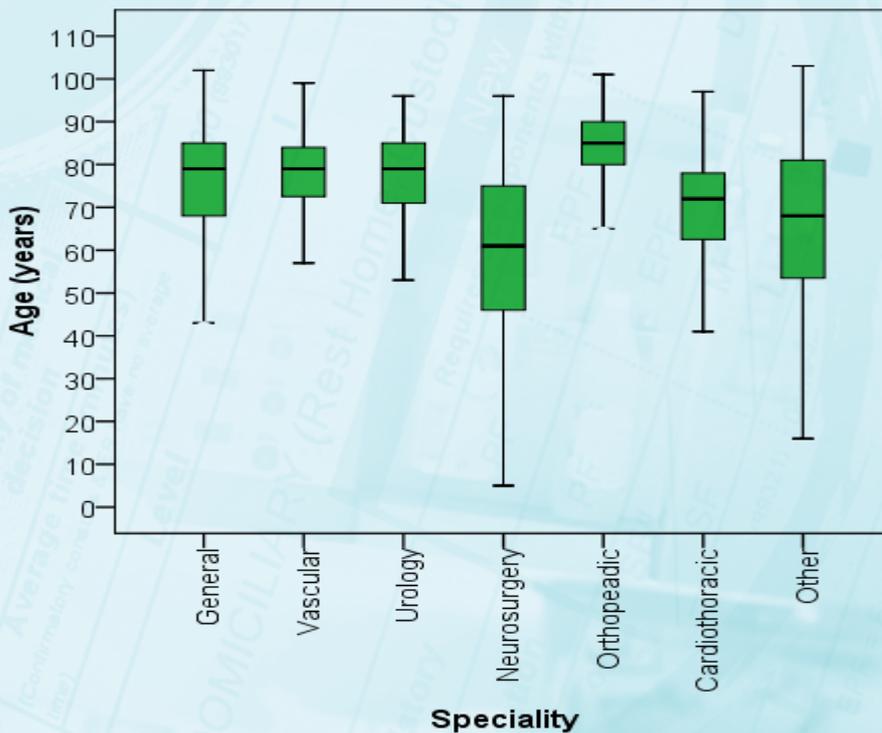


Figure 4.2: Age distribution of audited patients (2002–2009) (n=3916)



Note: Outliers and extreme values are excluded.

Figure 4.3: Age of audited patients by speciality (2002-2009) (n=3916)



Note: Other includes obstetrics & gynaecology, ophthalmology & otolaryngology, paediatrics and plastic surgery.



As expected, age of patients varies depending on the speciality, with patients in the neurosurgery category being appreciably younger than the other specialities.

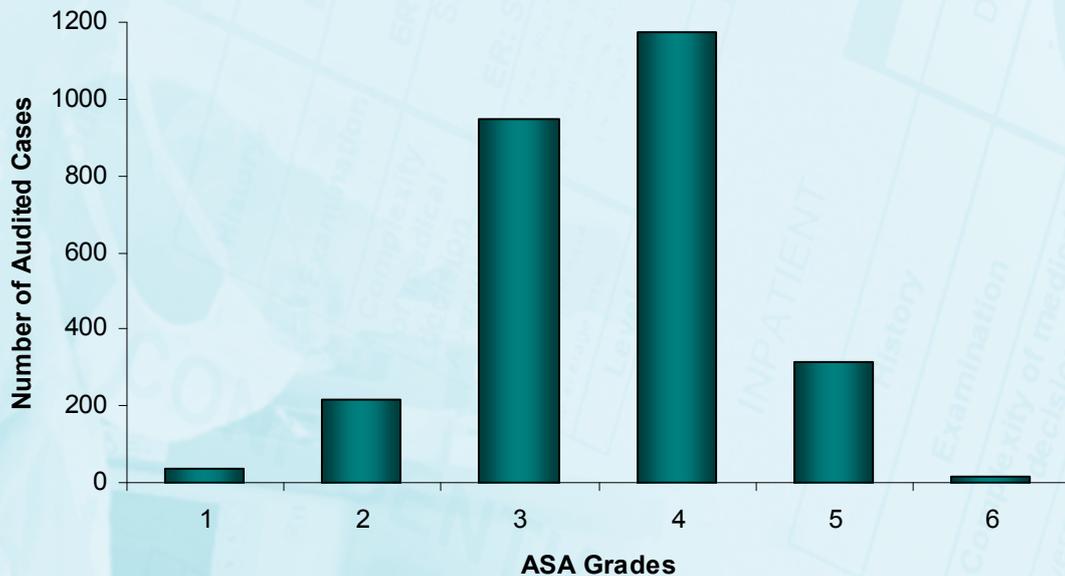
4.1.2 American Society of Anaesthesiologists (ASA) grades

The American Society of Anaesthesiologists grades are an internationally recognised classification of preoperative physical status (see Tables 4.3 and 4.4).

Table 4.3: ASA Grades

ASA Grade	Characteristics
1	A normal healthy patient
2	A patient with mild systemic disease and no functional limitation
3	A patient with moderate systemic disease and definite functional limitation
4	A patient with severe systemic disease that is a constant threat to life
5	A moribund patient unlikely to survive 24 hours, with or without an operation
6	A brain dead patient for organ donation

Figure 4.4: ASA Grades (2002-2009) (n=2583)



Note: Data missing for 1333 cases.

Comment

Seventy eight per cent of patients have an ASA grade of either 3 or 4, meaning that they were assessed as either having a moderate or severe degree of systemic disease upon admission to hospital.

ASA grade is a simple but important measure of co-morbidity and is routinely recorded on the anaesthetic record. This important data point was missing in half the forms returned to WAASM. Surgeons need to address this. It will become a critical issue if any sort of analysis with risk adjustment is undertaken.



4.1.3 Cause of death

The most common causes of death among audited cases are shown in Table 4.4. The most common causes of death in those aged less than 70 years were brain haemorrhage and multiple organ failure. The latter is often secondary to sepsis. In those older than 70 years the main causes of death were heart failure and septicaemia. Details on cause of death for all patients can be found in Appendix 1.

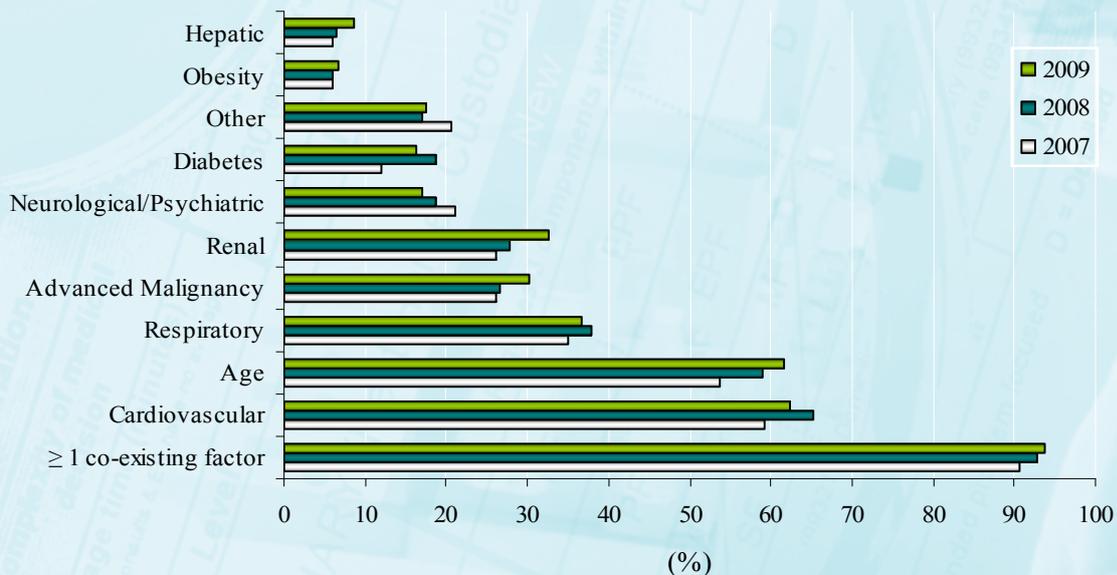
Table 4.4: Most common causes of death in audited cases (2002–2009) (n=4052)

CAUSES OF DEATH		
Cases <70 years old (n=1157)	n	(%)
Multiple organ failure	92	8
Brain Haemorrhage	87	8
Septicaemia	81	7
Malignancy	79	7
Respiratory failure	44	4
Cases ≥ 70 years old (n= 2895)		
Acute myocardial infarction	225	8
Septicaemia	219	8
Multiple organ failure	199	7
Respiratory failure	153	5
Pneumonia	144	5
Malignancy	124	4

4.1.4 Co-morbidity

Surgeons are asked to indicate if there are any significant co-morbidities. Neurosurgeons do not complete this question in their form and are therefore excluded from this analysis (Figure 4.5)

Figure 4.5: Co-morbidity status in completed cases 2007, 2008 & 2009



Note: neurosurgical cases excluded.

Comment

Over 90% of patients had more than one co-existing factor for the last three years of the audit. Surgical risk clearly increased based upon the pre-existing patient condition.



4.1.5 High dependency and intensive care units

Table 4.5 shows the use (actual and perceived) of a high dependency or intensive care unit.

Table 4.5: Actual use & assessor opinion of use of a high dependency or intensive care unit

	Number of Cases (%)							
	2002 (n=397)	2003 (n=386)	2004 (n=429)	2005 (n=464)	2006 (n=495)	2007 (n=461)	2008 (n=474)	2009 (n=292)
Use of ICU	142 (36)	149 (39)	154 (36)	158 (34)	184 (37)	148 (32)	154 (32)	92 (32)
Use of HDU	64 (16)	69 (18)	72 (17)	66 (14)	66 (13)	82 (18)	47 (10)	40 (14)
<i>Assessors opinion on cases where patient was not admitted to either ICU or HDU</i>								
ICU should have been used	9 (2)	1 (<1)	14 (3)	5 (1)	9 (2)	8 (2)	4 (1)	1 (<1)
HDU should have been used	66 (17)	33 (8)	32 (7)	27 (6)	21 (4)	29 (6)	38 (8)	15 (5)

Note: Number of cases based on completed cases and excludes neurological cases. ICU = intensive care unit, HDU = high dependency unit

Comment

As in previous years a significant number of patients who would potentially have benefited from HDU care were not admitted to such a unit. Other patients who did not die might also have also benefited from HDU care. This data has been consistent over many years and the clear implication is that there is a deficiency of HDU use in WA.



4.2 Comparison of surgeons' and assessors' views

KEY POINTS

- Assessors reported more areas of concern or adverse events than the associated surgeon.
- A review that has considered this matter in depth appears at the end of this Annual Report

Incidents reported by the surgeons and assessors were compared (Table 4.6). This system of classifying events was introduced in November 2003; hence data reported is from 2004 to 2009.

Table 4.6: Surgeons' & assessors' views on performance (2004–2009)

		ASSESSOR				
YEAR	SURGEON	Consideration	Concern	Adverse Event	No Event	Total
2004	Consideration	22	15	5	23	65
	Concern	5	7	9	4	25
	Adverse Event	3	0	6	3	12
	No Event	43	23	16	286	368
	Total	73	45	36	316	470
2005	Consideration	14	15	5	15	49
	Concern	3	9	6	5	23
	Adverse Event	1	2	6	1	10
	No Event	29	23	24	366	442
	Total	47	49	41	387	524
2006	Consideration	14	7	8	15	44
	Concern	3	10	4	9	26
	Adverse Event	3	5	9	2	19
	No Event	36	25	18	426	505
	Total	56	47	39	452	594
2007	Consideration	8	9	6	20	43
	Concern	4	9	2	5	20
	Adverse Event	1	1	9	2	13
	No Event	36	15	30	374	455
	Total	49	34	47	401	531
2008	Consideration	19	12	7	12	50
	Concern	1	8	4	2	15
	Adverse Event	1	5	6	2	14
	No Event	53	19	31	362	465
	Total	74	44	48	378	544
2009	Consideration	3	1	2	13	19
	Concern	3	5	1	4	13
	Adverse Event	0	3	4	0	7
	No Event	26	8	5	246	285
	Total	32	17	12	263	324

Notes:

1. Data can only be analysed when both surgeon & assessor have completed the proforma.
2. Missing data will account for differences in numbers.



Figure 4.6: Percentage of adverse events reported by surgeons & assessors

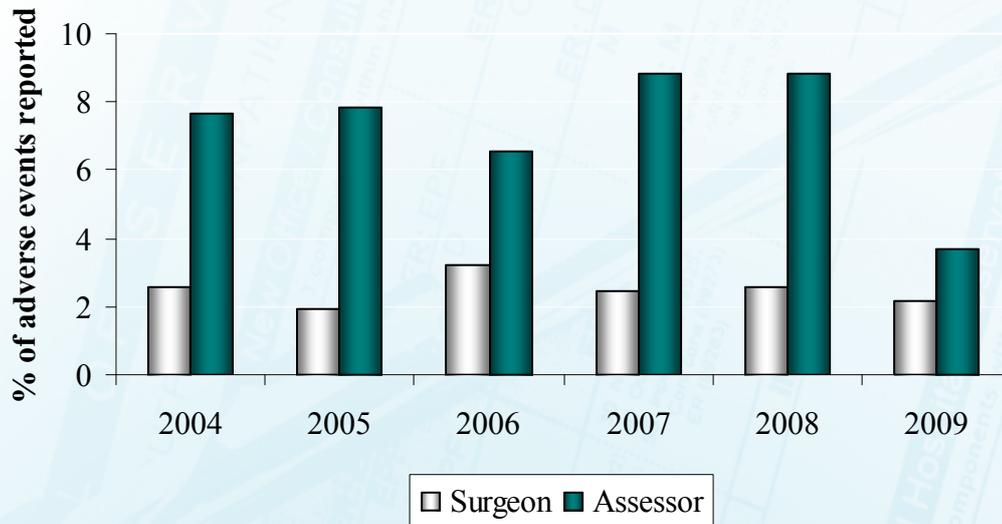


Figure 4.6 compares the proportion of adverse events reported by surgeons and assessors for the same cases. Each year the assessors reported more adverse events than the treating surgeons.

Kappa scores measure the level of agreement or variation between two observers. Kappa scores were obtained for surgeon and assessors view on performance. The levels of agreement (Kappa score) by year can be seen in Table 4.7.

Table 4.7: Level of agreement between surgeons’ & assessors’ views on performance

Year	Kappa Score (95% Confidence Interval)
2004	0.288 (0.217 - 0.358)
2005	0.322 (0.249 - 0.394)
2006	0.333 (0.260 - 0.405)
2007	0.276 (0.199 - 0.353)
2008	0.295 (0.227 - 0.365)
2009	0.265 (0.154 - 0.377)

Interpretation of Kappa scores: <0 = no agreement, 0.0-0.19 = poor agreement, 0.20-0.39=fair agreement, 0.40-0.59 = moderate agreement, 0.60-0.79 = substantial agreement, 0.80-1.00 = almost perfect agreement.

Comment

From previous annual reports, it appears that surgeons under-report events that the assessors believe represent an area of concern or adverse events. For example in 2009, assessors reported twelve adverse events compared to seven reported by the surgeon.



4.3 Clinical events

KEY POINTS

- Assessors considered that preventable adverse events caused death in less than 1% of cases in 2009.

4.3.1 Reported areas for consideration, of concern and adverse events

Table 4.8: Audited deaths associated with areas for consideration, of concern, or adverse events as reported by assessors (most significant event only)

	Number of Cases (%)								
	2002	2003	2004	2005	2006	2007	2008	2009	Total
Total Cases	411	383	470	524	594	531	544	324	3781
Area for consideration	17 (4)	32 (8)	73 (16)	47 (9)	56 (9)	49 (9)	74 (14)	32 (10)	380 (10)
Area for concern	42 (10)	33 (9)	45 (10)	49 (9)	47 (8)	34 (6)	44 (8)	17 (5)	311 (8)
Adverse event (AE)	64 (16)	35 (9)	36 (8)	41 (8)	39 (7)	47 (9)	48 (9)	12 (4)	322 (9)
AE that caused death	24 (6)	18 (5)	14 (3)	20 (4)	22 (4)	26 (5)	31 (6)	8 (2)	163 (4)
AE that caused death, considered definitely preventable	17 (4)	11 (3)	13 (3)	14 (3)	7 (1)	10 (2)	5 (<1)	3 (<1)	80 (2)

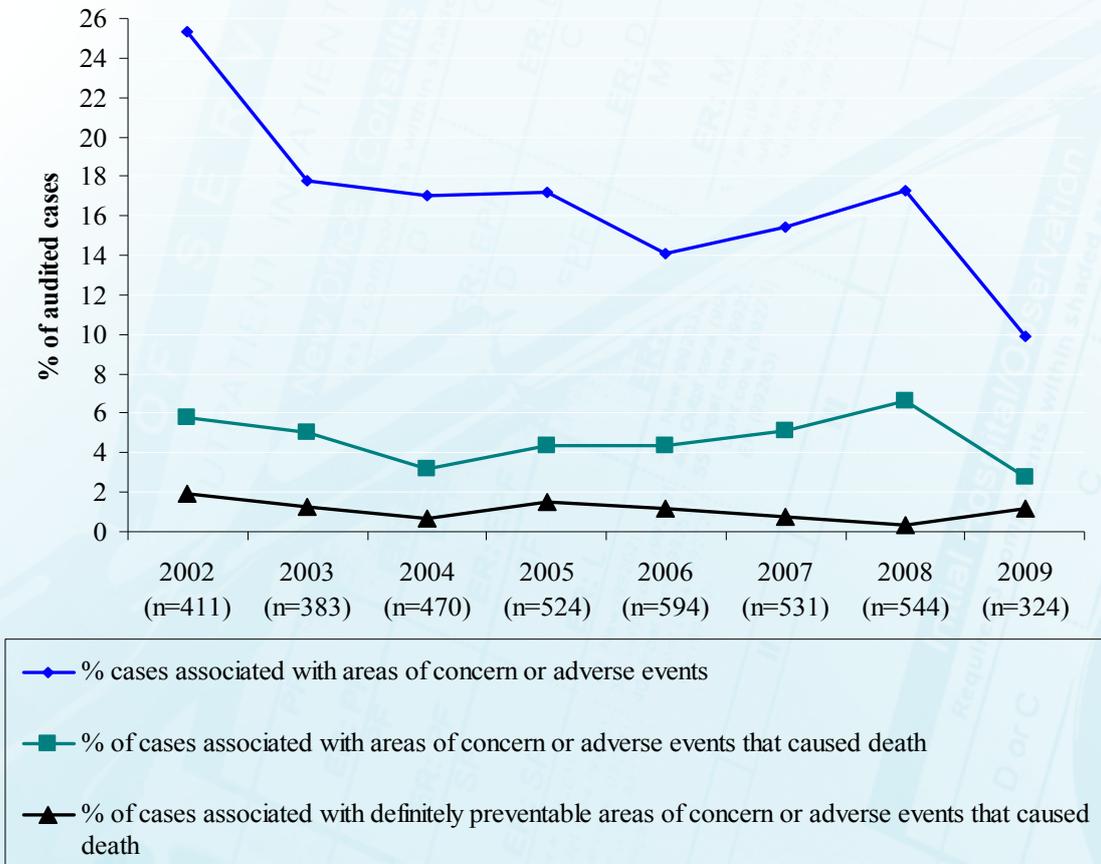
Note: Terminal care cases excluded.

Comment

Assessors considered that there was an area of concern or adverse event in 17% of total cases. In 2009, 2% of cases had an adverse event that caused death and in <1% of cases the death was considered definitely preventable (Table 4.8). Both of these figures are below the overall averages with 4% of cases associated with an adverse event that caused death and 2% of cases associated with an adverse event that caused death but was considered definitely preventable for the total audit period (2002-2009) (Table 4.8). Figure 4.7 shows the percentage of audited cases associated with adverse events or areas of concern (2002-2009).



Figure 4.7: Cases associated with adverse events or areas of concern (2002-2009)



4.4 Admissions

4.4.1 Overview of admissions

The audit data with regards to admission cover:

- the type of hospital (public or private)
- the type of admission (emergency or elective)
- whether the patient underwent an operation (operative or non-operative)

The results presented in this section examine these different areas.

KEY POINTS (Table 4.9)

- Over the period 2002-2009, 80% of cases were admitted to public hospitals.
- Of the 2976 cases admitted to public hospitals, 13% were elective admissions. Of the 651 cases admitted to private hospitals, 41% were elective admissions.
- Of the emergency cases admitted to public hospitals, 65% underwent an operation, compared to 86% of emergency cases in private hospitals ($P<0.001$).
- The proportion of area of concern or adverse events associated with cases that underwent operation (elective and emergency admissions) was not significantly different between public and private hospitals ($P=0.064$)^a.
- Considering all hospitals, the proportion of areas of concern or adverse events associated with emergency admissions (14%) was significantly less than the proportion of events associated with elective admissions (31%) ($P<0.001$)^a.

^a Pearson’s Chi-square test



4.4.2 Relationship between factors related to admission data

KEY POINTS (Table 4.9)

- 72% of cases underwent one or more operations.
- 92% of the elective cases underwent an operation. Among elective cases undergoing surgery, the proportion admitted to private hospitals (94%) was not significantly different from the proportion admitted to public hospitals (91%) ($P=0.307$).^a
- Of the 3046 emergency admissions, 68% underwent an operation. A significantly higher proportion of emergency admissions admitted to private hospitals underwent surgery (86%) compared to those admitted as an emergency to public hospitals (65%) ($P<0.001$).^a
- Among emergency admissions undergoing surgery and associated with areas of concern or adverse events, the proportion admitted to private hospitals (14%) was not significantly different from the proportion admitted to public hospitals (18%) ($P=0.101$).^a
- Among elective cases undergoing surgery and associated with areas of concern or adverse events, the proportion admitted to private hospitals (28%) was not significantly different to the proportion admitted to public hospitals (34%) ($P=0.118$).^a
- In those cases undergoing surgery, the proportion of elective cases associated with an area of concern or adverse event (32%) was significantly greater than the proportion in emergency cases (18%) ($P<0.001$).^a

^a Pearson's Chi-square test

Table 4.9: Elective and emergency admissions to public and private hospitals (all cases, 2002-2009)

Number of Cases (%)				
		Elective	Emergency	Total
(a) All cases	Private	270 (41)	381 (59)	651 (17)
	Public	399 (13)	2577 (87)	2976 (80)
	Co-location	15 (15)	88 (85)	103 (3)
	Total	684 (18)	3046 (82)	3730
(b) Cases associated with an area of concern or adverse event*	Private	74 (35)	51 (12)	125 (20)
	Public	133 (33)	355 (14)	488 (16)
	Co-location	3 (20)	11 (13)	14 (14)
	Total	210 (31)	417 (14)	627 (17)
(c) Cases that underwent an operation*	Private	253 (94)	327 (86)	580 (89)
	Public	363 (91)	1681 (65)	2044 (69)
	Co-location	14 (93)	56 (64)	70 (68)
	Total	630 (92)	2064 (68)	2694 (72)
(d) Cases that underwent an operation that were associated with an area of concern or adverse event†	Private	72 (28)	47 (14)	119 (21)
	Public	125 (34)	305 (18)	430 (21)
	Co-location	3 (21)	10 (18)	13 (19)
	Total	200 (32)	362 (18)	562 (21)

Note: Co-location refers to a case in which the patient has been in both public and private hospital. Missing data will account for differences in numbers. (Overall 51 cases are missing.)

*Percentages in parts (b) and (c) relate to figures in part (a).

†Percentages given in part (d) relate to figures in part (c)



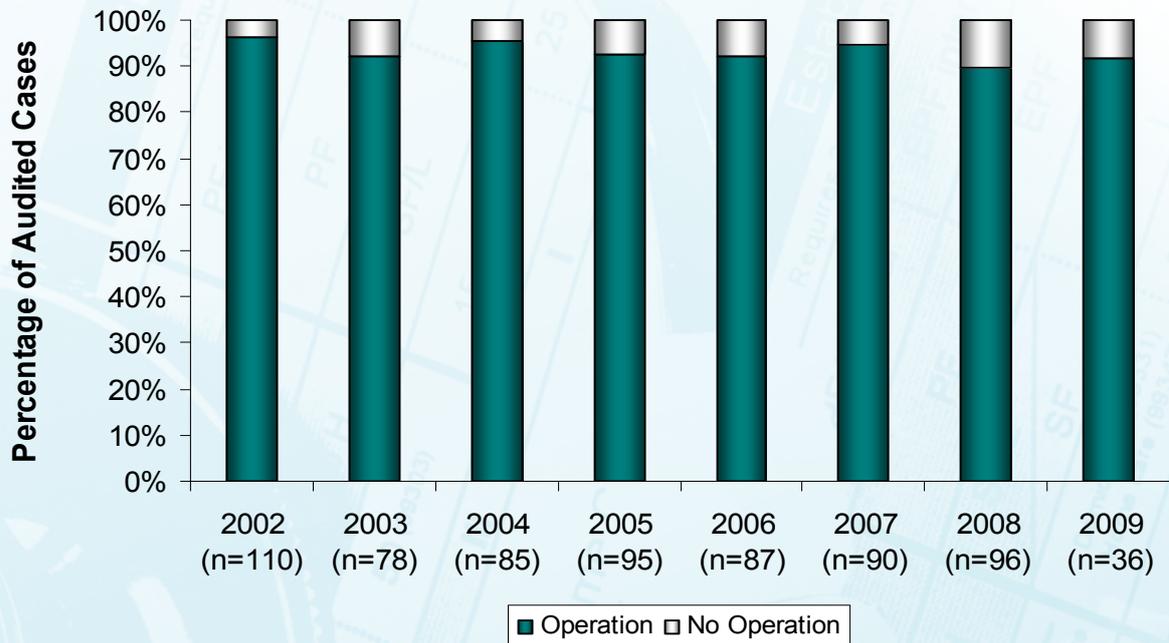
Table 4.10: Emergency admissions to private and public hospitals (2002–2009)

No. of cases (%)		
(a) By speciality		
Speciality	Emergency admissions to private hospitals (n= 381)	Emergency admission to public hospitals (n= 2577)
General	170 (45)	966 (37)
Orthopaedics	95 (25)	602 (23)
Urology	32 (8)	58 (2)
Cardiothoracic	33 (9)	128 (5)
Vascular	32 (8)	301 (12)
Neurosurgery	13 (3)	444 (17)
Other*	6 (2)	78 (3)
Underwent operation	327 (86)	1681 (65)
(b) Emergency admissions where no operation was performed		
Reason for no operation:	Emergency admission to private hospital (n= 51)	Emergency admission to public hospital (n= 867)
Active decision not to operate	26 (51)	387 (45)
Not a surgical problem	8 (16)	109 (13)
Patient refused operation	5 (10)	61 (7)
Rapid death	7 (14)	80 (9)
Missing data	5 (10)	230 (27)

*Note: Other includes ENT, ophthalmology, obstetrics & gynaecology, plastic, paediatrics, oral maxillo-facial.

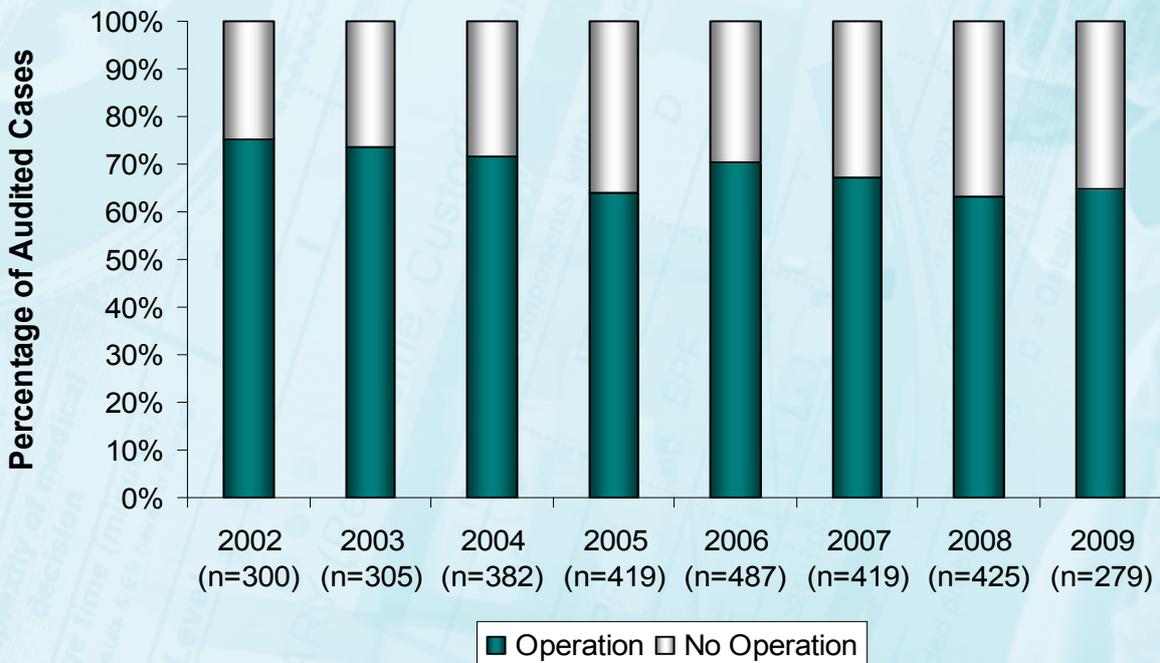


Figure 4.8: Percentage of elective admissions associated with operation or no operation (2002–2009) (n=677)



Note: Data missing for 7 cases; graph represents complete cases only.

Figure 4.9: Percentage of emergency admissions associated with operation or no operation (2002–2009) (n=3016)



Note: Data missing for 30 cases; graph represents complete cases only.

Comment

The proportions of emergency admissions that underwent an operation display a decreasing trend over the total audit period from 75% in 2002 to 65% in 2009



4.4.3 Areas of concern or adverse events associated with emergency or elective admission

Table 4.11: Emergency & elective admissions that were associated with areas of concern or adverse events (2002–2009)

Admission Type	Areas of concern or adverse events		
	Yes	No	Total (%)
Elective admission	210 (6)	475 (13)	685 (18)
Emergency admission	417 (11)	2631 (70)	3048 (82)
Total	627 (17)	3106 (83)	3733

Note: Data missing on 48 cases; cross tabulation only on complete data.

Figure 4.10: All audited emergency and elective admissions associated with areas of concern or adverse events (2002–2009) (n=627)

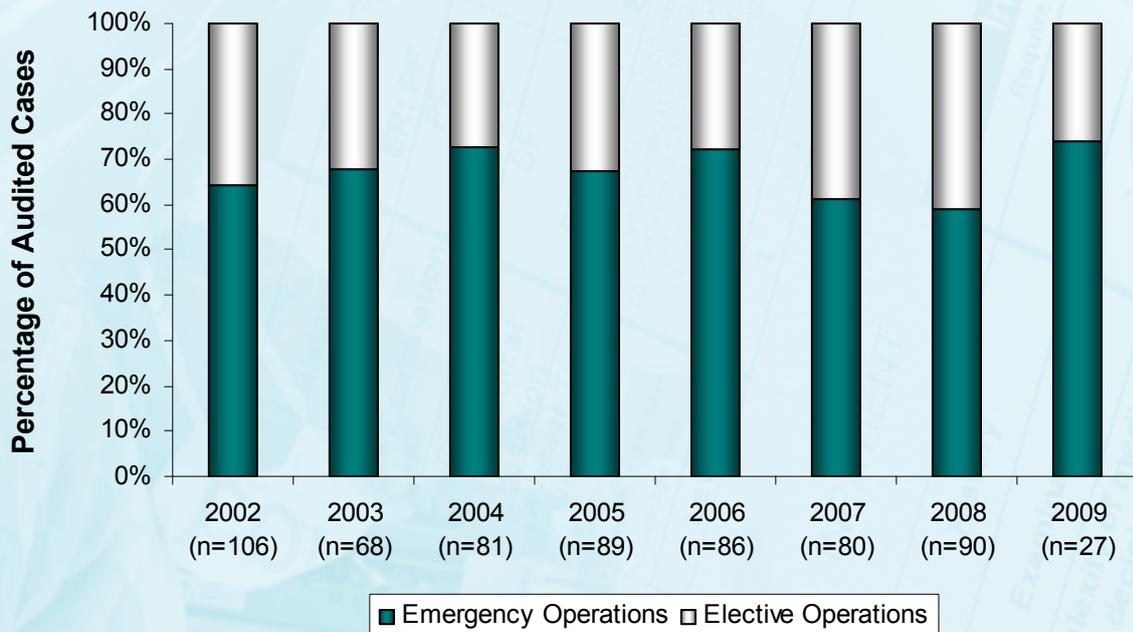
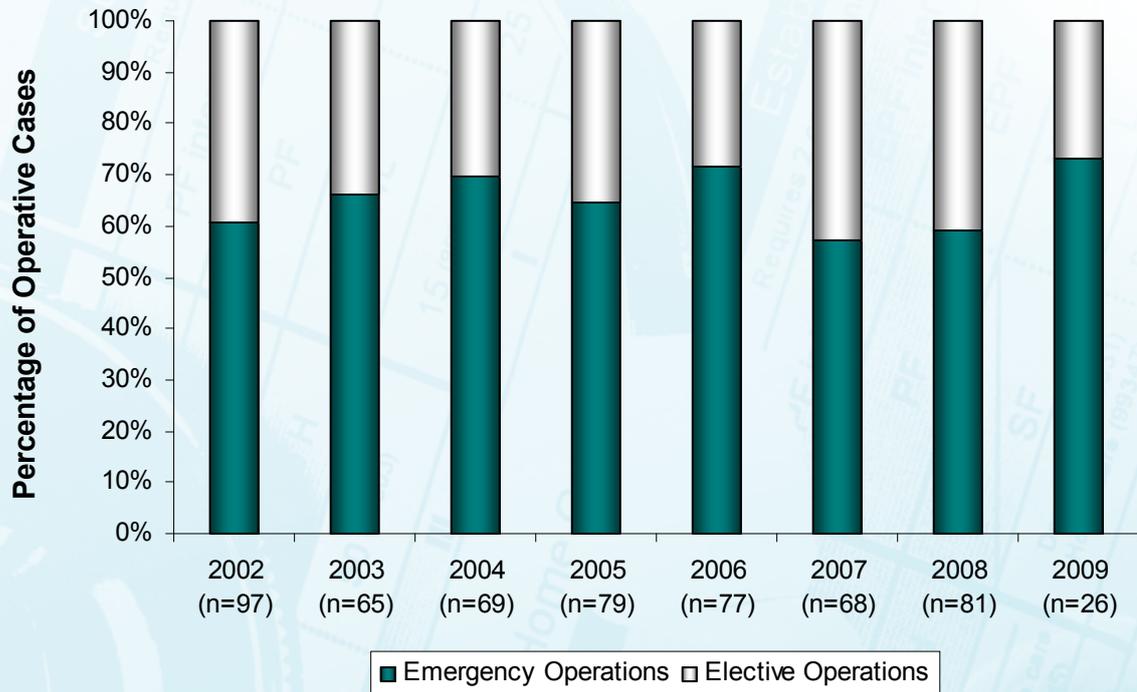




Figure 4.11: Operative cases associated with areas of concern or adverse events – elective and emergency admissions (2002–2009) (n=562)



Comment

There is a decreasing trend in emergency operations associated with areas of concern or adverse events. Similarly, there is a decrease in the proportion of elective surgeries associated with areas of concern or adverse events over the total audit period.

Table 4.12: All areas of concern or adverse events associated with elective admissions (2002–2009) (Total number of elective admissions = 687)

Area of concern or adverse event	Number of events	(%)
Related to surgery	80	38
General complications	28	13
Assessment problems	18	9
Delays	13	6
Failure to use facilities	12	6
Related to endoscopic surgery	10	5
Staff problems	10	5
Fluid balance	9	4
Drug-related problems	7	3
Monitoring problems	6	3
Related to laparoscopic surgery	4	2
Incorrect or inappropriate therapy	4	2
Communication failures	3	1
Anaesthesia-related problems	3	1
Patient factors	2	1



Table 4.13: All areas of concern or adverse events associated with emergency admissions (2002–2009) (Total number of emergency admissions=3076)

Area of concern or adverse event	Number of events	(%)
Delays	96	23
Incorrect or inappropriate therapy	83	20
Related to surgery	58	14
General complications	56	13
Diagnosis-related problems	20	5
Related to endoscopic surgery	15	4
Drug-related problems	14	3
Communication failures	13	3
Fluid balance	12	3
Failure to use facilities	10	2
Assessment problems	10	2
Related to laparoscopic surgery	5	1
Transfer problems	5	1
Patient factors	4	1
Staff problems	4	1
Problems with blood/blood products	4	1
Resuscitation problems	3	<1
Monitoring problems	3	<1
Anaesthesia-related problems	2	<1
TOTAL	417	

Note: Some cases are associated with more than one event.

Comment

Surgery-related events and general complications are the most common reasons for areas of concern or adverse events in elective admissions, while incorrect or inappropriate therapy and delays remain the most common reasons for an area of concern or adverse event in emergency admissions.



4.5 Operative and non-operative cases

KEY POINTS

- 27% of cases did not undergo an operation.
- In 2727 cases where an operation was undertaken, 6% of cases were abandoned.

4.5.1 Operative cases

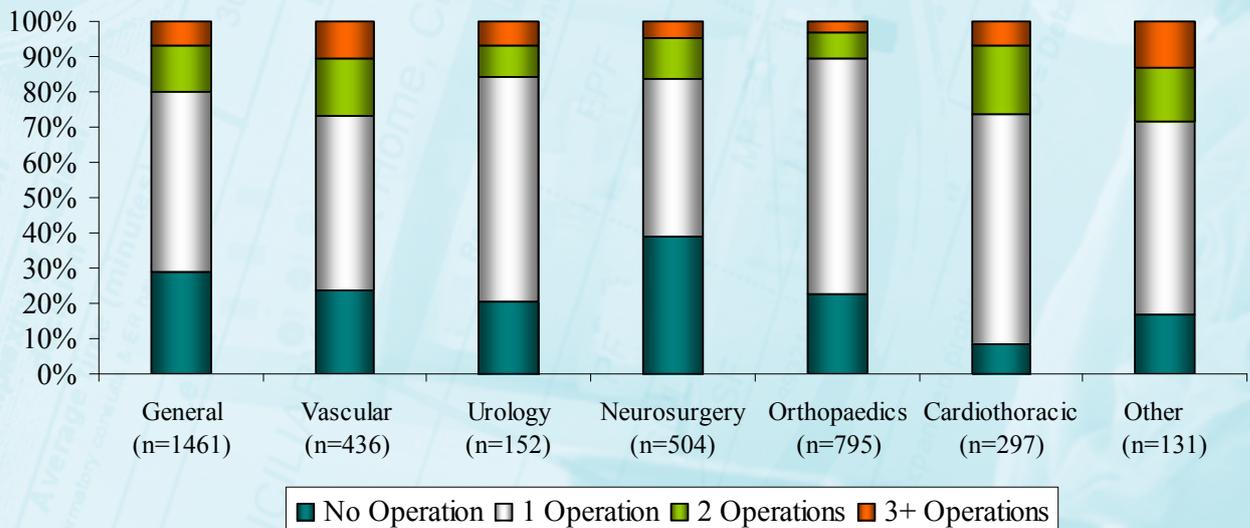
Data on operative cases appears below.

Table 4.14: Operations performed (2002-2009)

Number of Cases (%)									
Year	2002	2003	2004	2005	2006	2007	2008	2009	Total
Total Cases/Year	411	383	470	524	594	531	544	324	3781
Number of Operative Cases	333 (81)	297 (78)	356 (76)	357 (68)	427 (72)	375 (71)	365 (67)	217 (67)	2727 (72)
No Operation Performed	78 (19)	86 (22)	112 (24)	159 (30)	155 (26)	148 (28)	171 (31)	105 (32)	1014 (27)
1 Operation Performed	234 (57)	220 (57)	277 (59)	289 (55)	317 (53)	296 (56)	284 (52)	168 (52)	2085 (55)
2 Operations Performed	64 (16)	48 (13)	55 (12)	51 (10)	80 (13)	60 (11)	67 (12)	39 (12)	464 (12)
3+ Operations Performed	35 (9)	29 (8)	27 (6)	31 (6)	44 (7)	33 (6)	32 (6)	15 (5)	246 (7)

Note: Data missing on 40 cases; cross-tabulation performed with complete data only

Figure 4.12: Number of operations by speciality (2002–2009) (n=3781)



Note: Data missing on 5 cases



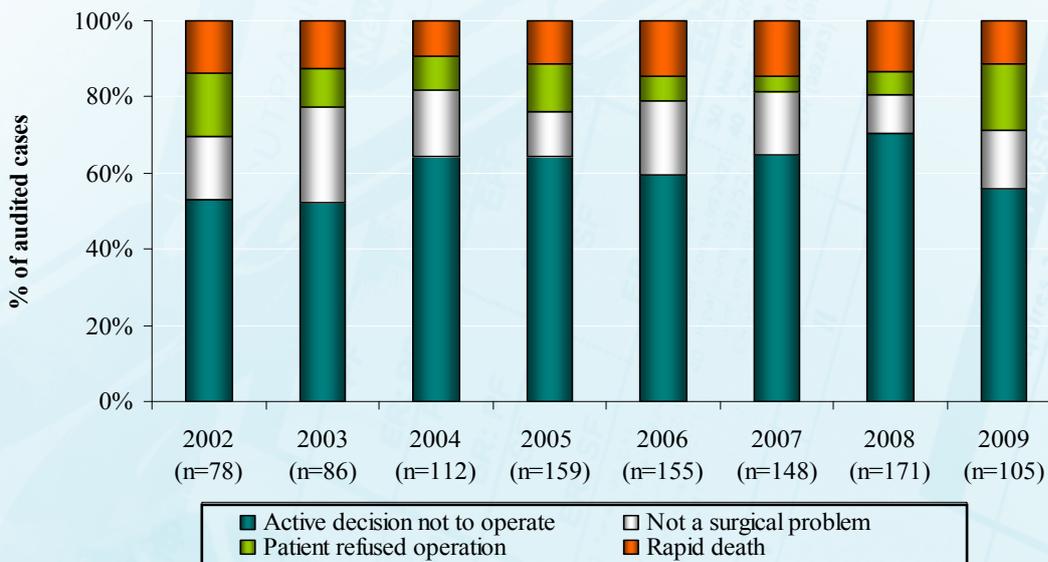
Comment

The proportion of operations performed or not performed have remained consistent over the total audit period. From 2002-2009 27% of cases did not undergo an operation, 55% underwent 1 operation, 12% underwent 2 operations and 7% underwent three or more operations. The numbers have remained consistent across the reporting years.

4.5.2 Non-operative cases

Data on non-operative cases appears below.

Figure 4.13: Reasons for no operation, all specialities (2002–2009) (n=1014)



Note: Some cases are associated with more than one reason for no operation.

Comment

Figure 4.13 illustrates a consistent trend towards an active decision on the part of the surgeon, patient and/or next of kin not to operate. Furthermore, there are a higher proportion of audited cases in which patients have refused surgery in 2009.

Table 4.15: Operations abandoned, including patients undergoing one or more surgical procedures (2002–2009)

	Number of Cases								
	2002	2003	2004	2005	2006	2007	2008	2009	Total
Abandoned at 1st operation	19 (6)	22 (7)	11 (3)	19 (5)	13 (3)	14 (4)	17 (5)	7 (3)	122 (5)
Abandoned at 2nd operation	6 (2)	2 (1)	2 (1)	4 (1)	3 (1)	3 (1)	2 (1)	1 (<1)	23 (1)
Abandoned at 3rd operation	2 (1)	3 (1)	1 (<1)	4 (1)	0 (0)	1 (<1)	1 (<1)	1 (<1)	13 (<1)
Total number of cases in which operation was abandoned (%)	27 (8)	27 (9)	14 (4)	27 (8)	16 (4)	18 (5)	20 (5)	9 (4)	158 (6)
Total number of operative cases	333	297	356	357	427	375	365	217	2727



4.5.3 Risk of death before surgery

Both surgeons and assessors are required to categorise the patient's pre-operative risk of death following an operation(s) (Table 4.16).

Table 4.16: Comparison of views of surgeons & assessors on pre-operative risk of death in cases undergoing an operation

Number of cases (%)				
Assessors' view of risk	Surgeons' view of risk			Total
	Minimal/small	Moderate	Considerable/Expected	
Minimal/small	122	60	41	223
Moderate	97	231	248	576
Considerable/expected	109	408	1066	1583
Total	328	699	1355	2382

Note: Data missing for 345 cases. Kappa measurements can only be calculated on complete information from both surgeon and assessor; Kappa score (K)=0.25, 95% CI 0.22–0.28 (p<0.001), indicating that surgeons and assessor were in 'fair agreement'.

4.5.4 Areas of concern or adverse events associated with operative and non-operative cases

Areas of concern and adverse events are depicted in Figures 4.14 and 4.15

Figure 4.14: Cases associated with areas of concern or adverse events in Western Australian teaching hospitals (n=450)

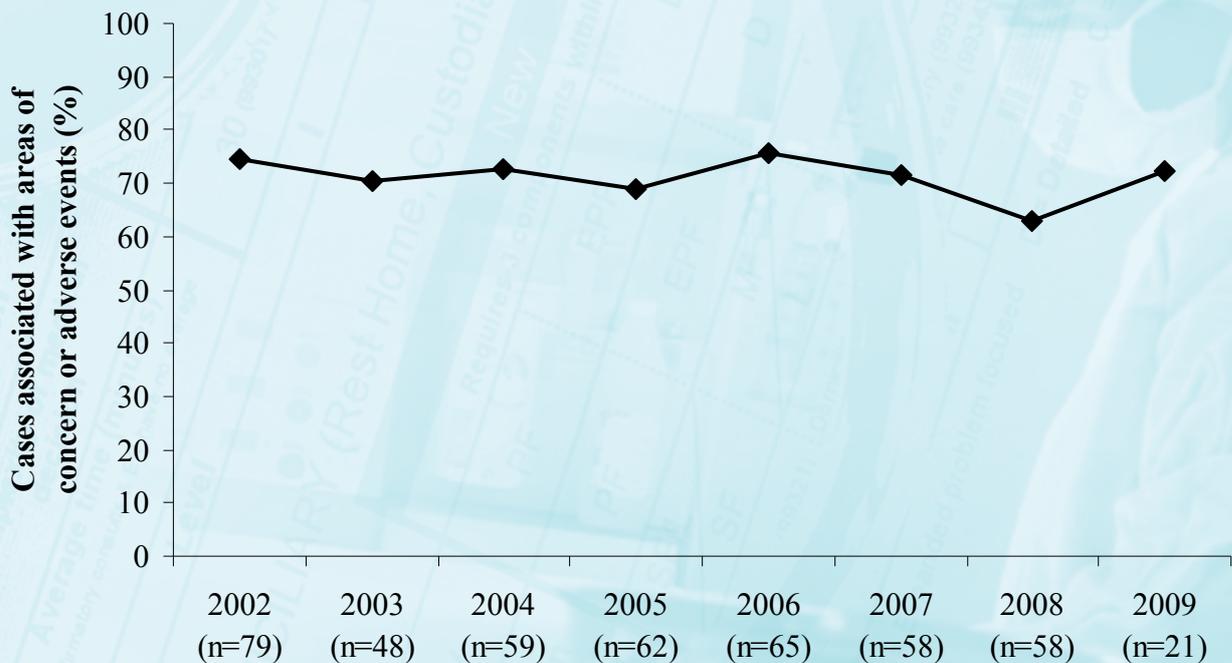
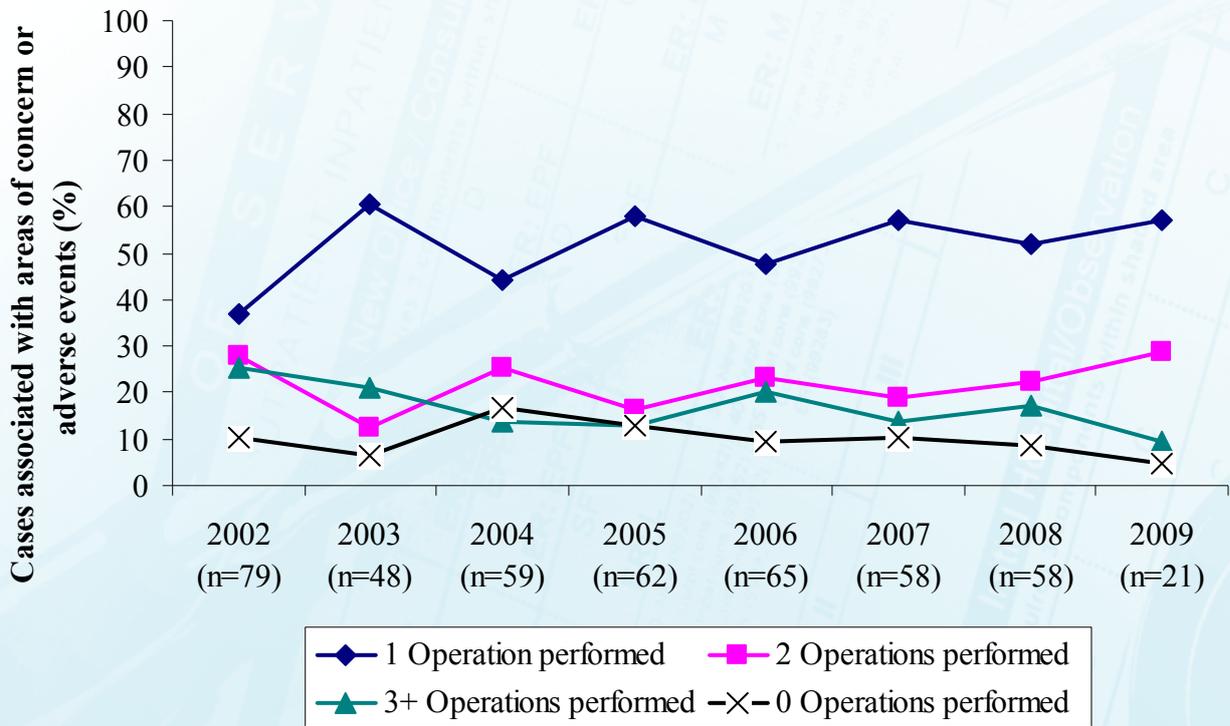




Figure 4.15: Areas of concern or adverse events associated with cases where more than one operation was performed in Western Australian teaching hospitals (n=450)



4.5.5 Unplanned return to theatre

Unplanned return to theatre is depicted in Table 4.17.

Table 4.17: Unplanned return to theatre (2004-2009)

Unplanned returns to theatre	Year						Total
	2004	2005	2006	2007	2008	2009	
Number of cases in which at least one operation was performed	356	357	427	375	365	217	2097
Cases where surgeons reported an unplanned return to theatre (%)	49 (14)	53 (15)	56 (13)	39 (10)	53 (15)	21 (10)	271 (13)

Comment

In 2009, cases where an unplanned return to theatre occurred decreased to 10% from 15% in 2008. Overall unplanned returns to theatre have remained consistently between 10-15%. Overall 13% of total cases reported an unplanned return to theatre over the total audit period (2004-2009).



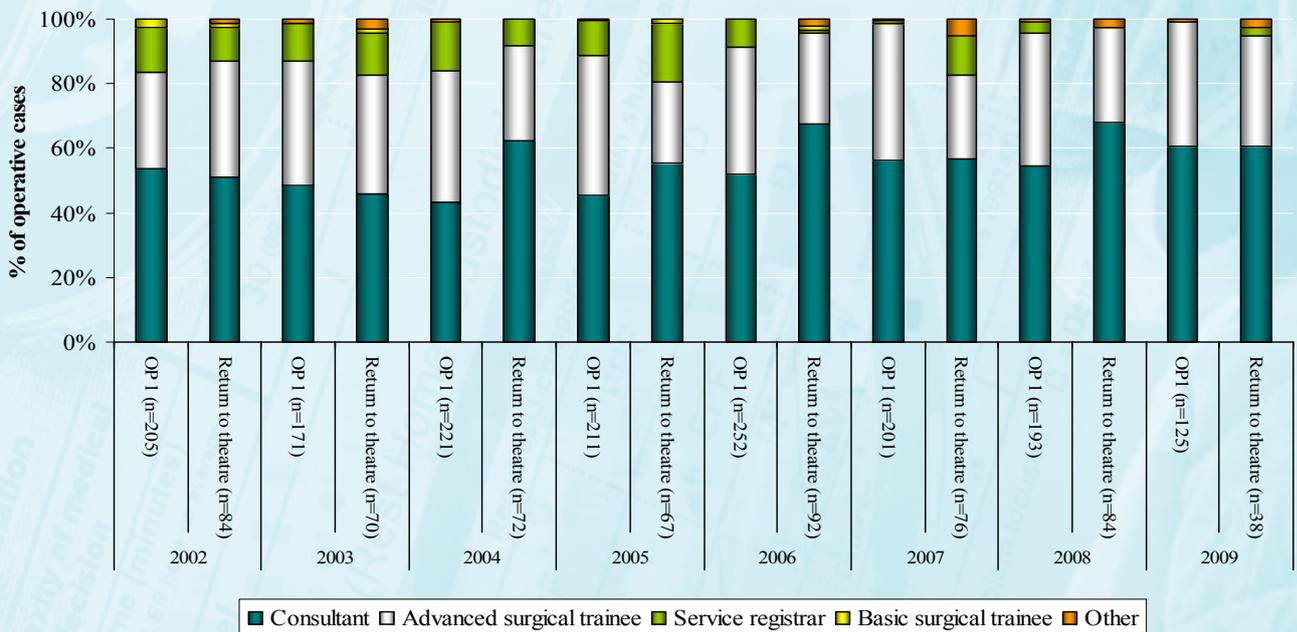
4.6 Grade of surgeon (teaching hospitals)

When completing the WAASM proforma, surgeons are asked to indicate the grade of surgeon making the operative decision, performing the operation and directly assisting during the operation.

Table 4.18: Deaths after surgery in Western Australian teaching hospitals (2002–2009)

	Number of cases (%)								
	2002	2003	2004	2005	2006	2007	2008	2009	Total
Number of audited operative cases in teaching hospitals	224	190	244	260	327	267	241	160	1913
Consultant decision to operate	196 (88)	161 (85)	223 (91)	223 (86)	287 (88)	218 (82)	194 (80)	132 (83)	1634 (85)
Consultant operating or directly assisting	123 (55)	100 (53)	123 (50)	116 (45)	152 (47)	125 (47)	126 (52)	89 (56)	954 (50)

Figure 4.16: Grade of surgeon performing first and subsequent operations, by year in Western Australian teaching hospitals (2002–2009)^a



^a Total OP1 n=1579; total return to theatre n=583.
 Notes: ‘Return to theatre’ includes all second, third or subsequent operations.
 Some of the information on grade of operating surgeon was missing.
 ‘Other’ includes interns, resident medical officers and senior registrars.



Figure 4.17: Consultant supervision in cases returned to theatre

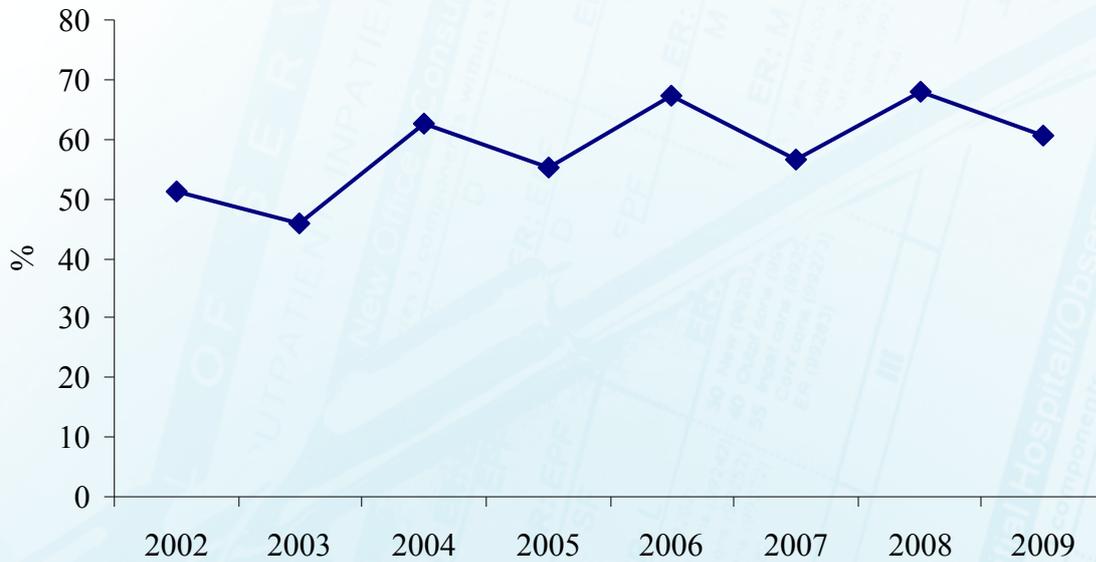


Figure 4.18: Consultant surgeons involved in primary operations, by year in Western Australian teaching hospitals (2002-2009)



Comment

There continues to be an increasing trend in the direct involvement of consultant surgeons when a patient undergoes a second or subsequent operation (Figure 4.17). Over the same period the proportion of cases associated with areas of concern or adverse events has decreased (refer to Figure 4.7).



4.7 Prophylaxis of thromboembolism

Surgeons are asked on the proforma whether deep vein thrombosis (DVT) prophylaxis was used and if not the reason why it was withheld. During case review assessors indicate whether they think that the decision was appropriate.

Figure 4.19: Use of DVT prophylaxis, by year (2002–2009) (n=3255)

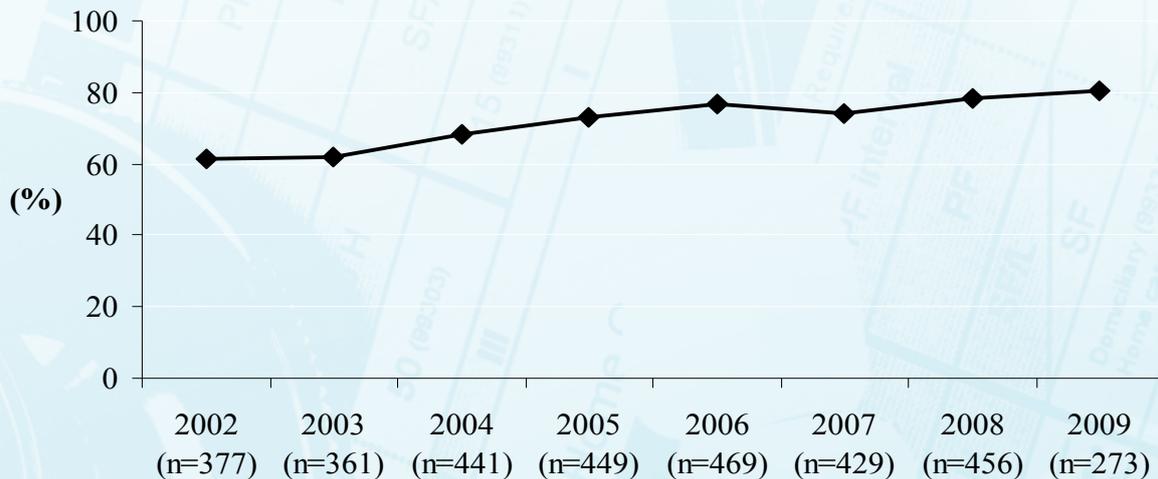
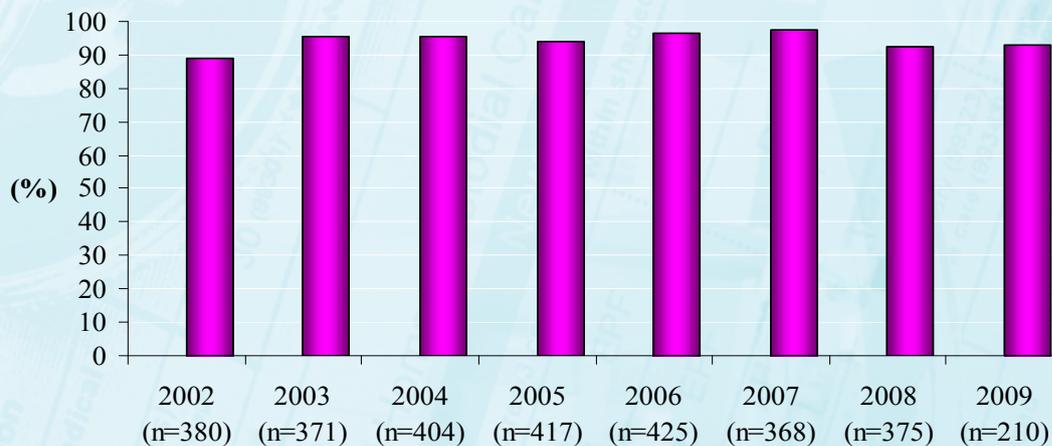


Figure 4.20: Cases where assessors noted that use of DVT prophylaxis was appropriate, by year (n=2950)



Note: Neurosurgeons do not complete this question in the proforma unless it has been flagged as an area of concern or adverse event.

Comment

DVT prophylaxis is now being given a very high priority in the Western Australian Safety and Quality agenda. The National Medical Director of the NHS has designated that tackling this is the number one priority in the UK. The overall trend recorded by WAASM is encouraging but given that the value of DVT prophylaxis is so well known this figure is less than satisfactory. Multiple factors almost always combined to create an overall failure in care. WAASM urges surgeons to very critically review what actually happened, as opposed to what was intended, whenever confronted by a DVT or pulmonary embolism.



4.8 Comparison of Surgeons/Assessors Reporting of Adverse Events

Summary

External peer review is a key part of the WAASM process. A four year period of WAASM data has been analysed (2004–2009) to look at this specific process. When an independent, external assessor recorded that an adverse event had contributed to a patient's death, the surgeon had only recorded an adverse event in 18% of those cases. An independent, external assessor should therefore review the management of all surgical patients who experience a significant deviation from expected care. Observations from this study are likely to have applicability to peer review processes in general.

Background

When surgeons complete a WAASM proforma they are asked to state if there has been a deficiency of care. They also need to define any deficiency of care as either an 'area of consideration', 'area of concern' or an 'adverse event'. The completed proforma then undergoes an anonymous first-line peer review by another surgeon within the same speciality. The first-line assessor completes a form that includes the same categories as the proforma. In about 10% of cases, the first-line assessor believes a more detailed review is required and the case notes are recalled. The notes are then sent to a second-line reviewer who does not work in the same hospital as the patient's surgeon. The second-line reviewer undertakes a more detailed analysis and then completes a second-line review form that includes the same categories as the original proforma and first-line review form.

Each year WAASM has noted that the first and second-line external assessors recorded a much greater number of adverse events than the surgeons.

The aim of this study was to analyse cases in which either the surgeon or the assessors had recorded an adverse event and to determine why this difference existed.

Methods

All cases in which either the first- or second-line assessors had recorded an adverse event from 2004 to 2007 inclusive were identified on the database and the original proformas were recalled. Each case was reviewed and the adverse event defined by the assessor was recorded. This was then matched to the deficiencies of care (if any) recorded by the surgeon.

Results

The external assessor recorded at least one adverse event in each of the 174 deaths. However, some deaths were associated with more than one adverse event. Some proformas were incomplete to the extent they could not be analysed. This analysis is therefore based on 169 adverse events. The deficiencies of care recorded by the surgeon who completed the original proforma, and those recorded by an external assessor have been summarised in the Table 4.19.

In 108 (64%) cases the assessor recorded an adverse event, but the surgeon did not record any deficiency of care. In only 30 (18%) cases did both the external assessor and the surgeon record an adverse event.

The five most common deficiencies of care that the surgeon failed to record as an adverse event would appear to be clearly defined, easily identifiable, events (e.g. postoperative haemorrhage). Four of these five most frequent events were failures of surgical management (see Table 4.19). The fifth was a fall in the hospital. The next most common reason was a delay of some description.



Discussion

The medical profession has consistently argued that self-regulation is its preferred review process for maintaining clinical safety and quality. This study shows that Western Australian surgeons have recorded significantly fewer adverse events than the independent, external assessors. The difficulty these surgeons have experienced in recognising and recording such events greatly weakens the argument of those seeking to maintain professional self-regulation.

Most surgical audits do not normally involve external peer review, although locally both the Medical Board of Western Australia and the Douglas Inquiry at the King Edward Memorial Hospital have previously recommended this. By contrast, independent, external review of serious incidents is a statutory requirement in many safety critical industries such as those involved with building, aviation, railway and nuclear power.

To address the discrepancy between the number of adverse events recorded by surgeons and external assessors, possible explanations for the observed difference need to be identified and resolved. These include:

1. WAASM may not have provided clear guidance as to the definition of an adverse event. This is a legitimate concern and is currently being addressed by the Steering Committee of the Australian and New Zealand Audits of Surgical Mortality. However, many of these adverse events were unequivocal in their nature (e.g. an anastomotic leak or postoperative haemorrhage) and led directly to the death of the patient.
2. Surgeons might argue that there can be a degree of subjectivity and that a different assessor might reach a different conclusion. The Victorian Audit of Surgical Mortality has undertaken a validation audit to address this concern. They found that if the initial first-line assessor thought a second-line review was required the 'validation' assessor, who was blinded to the fact that the case had already been assessed, agreed in 100% of cases. If the initial first-line assessor thought an adverse event had occurred, then the 'validation' assessor agreed in every case. There were some differences when classifying 'areas of consideration' and 'areas of concern'. In these cases the initial assessor identified the relevant issues, but the level of the classification varied between assessors. In Western Australia, some second-line reviews have been sent out for a further second-line review when the submitting surgeon raised concerns about the initial assessment. With one exception, the initial and the subsequent second-line reviewers reached a similar conclusion. This supports the view that the opinion of the reviewers is largely reproducible.
3. Surgeons might be reluctant to record an adverse event if it was preventable. This is the reason why WAASM offers both the surgeon and the external assessor an option to record preventability. For example, a pulmonary embolism will always be an adverse event, but if all the prophylactic steps have been taken then it will be an unpreventable adverse event. However, WAASM has examples of high risk patients, including some who have had a previous DVT, who were offered no prophylactic management and subsequently died of a pulmonary embolism. Such deaths are potentially preventable.
4. Surgeons may be more reluctant to record an adverse event if it was the fault of the surgical team. WAASM offers both the surgeon and the assessor an option to record the adverse event against another clinician, unit or hospital so this cannot be explained.
5. Surgeons may not review the case notes when completing the WAASM proforma and therefore may not detect possible errors of care that are then noted by the assessor who has to review the notes. There is plenty of evidence from WAASM and other mortality audits



that surgeons do not always give the proformas due attention. This could be in part due to clinicians not providing dedicated time for participation in clinical audits. Incomplete or inaccurate data can have a significant effect on the quality of an audit. Delays in delivering the case notes to the surgeon are also likely to also be a significant contributing factor.

6. There could also be a view that, on occasion, surgeons under-record such events in an attempt to avoid scrutiny.

This failure to recognise errors probably also extends to the hospitals. WAASM's external assessors classified these deaths under Health Round Table criteria as IV and V, but neither hospital appeared to recognise the serious failures of care, despite a review by the hospital mortality review committee and after a Root Cause Analysis. It is possible that neither hospital had an external reviewer involved in the process. These observations are likely to be applicable to other audits that do not include external scrutiny.

The Australian Commission on Safety and Quality in Health Care has in its 'Draft Review by Peers' guide indicating that it may be beneficial in some cases to undertake external peer to prevent conflict of interest or bias. External peer review is the standard demanded by statute for other safety critical organisations. It is desirable that the medical profession should also adhere to the same principle. It would not be practical to review every potential surgical patient. A starting point would be to review all deaths with easily identifiable events such as a return to theatre, unplanned admission or re-admission to hospital or ICU, and hospital stays of greater than 14 days. This would not capture every incident, but it would represent an acceptable compromise between perfection and the achievable.

Avoidable medical errors are a significant problem that incur a huge financial cost to society and potentially cause individual patients significant hardship, even perhaps their life. The medical profession currently has the privilege and responsibility of self-regulation. The results from WAASM suggest that surgeons are not self-regulating to the best of their ability. By highlighting the issue and introducing means to improve the categorisation of adverse events by surgeons, significant improvements in their recognition can be achieved. This is a first and essential step in the process of reducing adverse events and thus improving patient care.

Conclusion

Surgeons can form their own view as to how these deaths should have been classified. WAASM would argue that in each death described above the external, independent peer review undertaken by WAASM identified failures of care that were missed by either the surgeon or the hospital. Surgeons should also know that it is a requirement of the WA Department of Health under the Western Australian Review of Mortality (WARM) that any death categorised HRT IV or V is reported to them. Deaths classified as I to III do not have to be reported.



Table 4.19 Adverse Events as Recorded by Surgeons and Assessors

Cause of Death	Surgeon categories (%)								Total
	Nil		Consideration		Concern		Adverse Event		
Anastomotic leak	20	57%	3	9%	3	9%	9	26%	35
Technical error	17	52%	2	6%	3	9%	11	33%	33
Fall	10	83%	0	0%	0	0%	2	17%	12
PE prophylaxis incorrect	10	77%	1	8%	2	15%	0	0%	13
Postoperative haemorrhage	9	75%	0	0%	0	0%	3	25%	12
Delay	6	75%	1	13%	0	0%	1	13%	8
Sepsis - management	5	100%	0	0%	0	0%	0	0%	5
Tracheotomy accidentally removed	4	100%	0	0%	0	0%	0	0%	4
Delay in diagnosis	4	57%	2	29%	1	14%	0	0%	7
Diagnosis - wrong	3	75%	0	0%	1	25%	0	0%	4
Anaphylaxis shock	2	100%	0	0%	0	0%	0	0%	2
Communication failure	2	100%	0	0%	0	0%	0	0%	2
Delay in management (not surgical)	2	67%	1	33%	0	0%	0	0%	3
Infected hip	2	67%	1	33%	0	0%	0	0%	3
Decision to operate	2	67%	0	0%	1	33%	0	0%	3
Suicide	1	100%	0	0%	0	0%	0	0%	1
Antibiotic prophylaxis incorrect	1	100%	0	0%	0	0%	0	0%	1
Arrest (endoscopy)	1	100%	0	0%	0	0%	0	0%	1
Pressure sore	1	100%	0	0%	0	0%	0	0%	1
Pancreatitis	1	100%	0	0%	0	0%	0	0%	1
Transfer problem	1	100%	0	0%	0	0%	0	0%	1
Aspiration pneumonia	1	33%	0	0%	1	33%	1	33%	3
Postoperative manage - unspecified	1	50%	0	0%	1	50%	0	0%	2
Drug error	1	25%	1	25%	0	0%	2	50%	4
Fluid management	1	25%	1	25%	2	50%	0	0%	4
Stroke	0	0%	0	0%	0	0%	1	100%	1
Operation wrong	0	0%	1	100%	0	0%	0	0%	1
Anticoagulation incorrect	0	0%	1	100%	0	0%	0	0%	1
HDU	0	0%	0	0%	1	100%	0	0%	1
Total	108	64%	15	9%	16	9%	30	18%	169



5 PERFORMANCE REVIEW

This section reviews progress made on each of the recommendations of the 2009 WAASM annual report.

5.1 Review why and where surgeons and assessors rate adverse events differently

The study has been included in this annual report (section 4.8).

5.2 To review deaths after upper GI haemorrhage

This study is currently underway and will be published in the next WAASM newsletter.

5.3 To review the reasons for returns to theatre

This study is currently underway and will be published in the next WAASM newsletter.

5.4 Western Australian surgeons should ensure that all proformas are completed fully

This is an issue that has also been raised by other states and at a national level. Now that participation in a WA mortality audit is mandatory, WAASM will be able to return incomplete proformas to the surgeon and unless returned completed that surgeon and the case record form will appear with an incomplete record. This position will be further entrenched as the College has made participation in mortality audits part of Continuing Professional Development.

5.5 Case Note Review Booklet

A booklet containing illustrative surgical cases is produced twice a year for distribution to surgeons. The de-identified cases are based on assessors' comments and all have a clinical message. This seems to have been well received by the surgical community with a new section "Letters to the Editor" allowing surgeons to discuss the cases with the Chairman and readers.



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 - Mr James Aitken
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- Chairman	Mr James Aitken
- Project Manager	Dr Diana Azzam
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○ Professor Guy Maddern	Chair, RAAS; Chair ANZASM SC
○ Dr Wendy Babidge	Director, RAAS Division
○ Mr Gordon Guy	ANZASM Manager



APPENDIX 1: Cause of death reported to WAASM

Table A1.1: Cause of Death in Men Aged <70 (n=696)		
Cause of Death	n	%
Brain Haemorrhage	81	12
Heart Failure	80	11
Severe Brain Injury	67	10
Multiple Organ Failure	57	8
Septicaemia	51	7
Malignancy	50	7
Missing Data	41	6
Respiratory Failure	32	5
Cerebral Oedema	28	4
Brain Stroke	24	3
Pneumonia	24	3
Vascular Insufficiency of Intestine	19	3
Severe Multiple Injuries	15	2
Other	15	2
Haemorrhage Other	15	2
Cardio respiratory Failure	14	2
Cause Unknown	14	2
Aspiration Pneumonia	14	2
Infection	14	2
Liver Failure	13	2
Renal Failure	12	2
Pulmonary Embolism	11	2
Severe Burns	3	<1
Aortic Aneurysm	2	<1

Table A1.2 Cause of Death in Women Aged <70 (n=386)		
Cause of Death	n	%
Heart Failure	41	11
Brain Haemorrhage	35	9
Septicaemia	32	8
Multiple Organ Failure	32	8
Aortic Aneurysm	29	8
Respiratory Failure	26	7
Malignancy	23	6
Infection	20	5
Brain Stroke	18	5
Cerebral Oedema	17	4
Other Haemorrhage	14	4
Severe Head and/or Brain Injury	11	3
Pneumonia	10	3
Aspiration Pneumonia	10	3
Other	9	2
Missing Data	8	2
Liver Failure	8	2
Intestinal Obstruction and Related Problems	7	2
Vascular Insufficiency of Intestine	6	2
Renal Failure	6	2
Cause Unknown	6	2
Brain Death	6	2



Pulmonary Embolism	5	1
Cardiopulmonary Failure	2	1
Severe Burns	2	1
Fracture Related	2	1
Severe Multiple Injuries	1	<1

Table A1.3: Cause of Death in Men Aged ≥ 70 (n=1408)		
Cause of Death	n	%
Heart Failure	299	21
Respiratory Failure	127	9
Septicaemia	119	8
Pneumonia	106	8
Multiple Organ Failure	80	6
Malignancy	74	5
Missing Data	74	5
Renal Failure	61	4
Vascular Insufficiency of the Intestine	60	4
Aortic Aneurysm	57	4
Aspiration Pneumonia	43	3
Brain Haemorrhage	43	3
Other	38	3
Infection	35	2
Brain Stroke	32	2
Cause Unknown	30	2
Intestinal Obstructions and Perforations	25	2
Pulmonary Oedema	24	2
Haemorrhage (Other)	21	1
Pulmonary Embolism	19	1
Severe Head and/or Brain Injury	14	1
Liver Failure	7	<1
Severe Multiple Injuries	5	<1
Fractures	5	<1
Aneurysm (not cerebral or aortic)	4	<1
Cerebral Oedema	4	<1
Severe Burns	2	<1



Table A1.4: Cause of Death in Women Aged ≥70 (n=1402)		
Cause of Death	n	%
Heart Failure	312	22
Septicemia	120	9
Multiple Organ Failure	118	8
Vascular Insufficiency of Intestine	117	8
Brain Haemorrhage	92	7
Respiratory Failure	84	6
Renal Failure	69	5
Missing Data	65	5
Cardiorespiratory Failure	60	4
Infection	58	4
Pneumonia	57	4
Malignancy	49	3
Aspiration Pneumonia	45	3
Other	45	3
Aortic Aneurysm	39	3
Pulmonary Embolism	30	2
Cause Unknown	23	2
Brain Stroke	9	1
DVT Related	6	<1
Brain Other	4	<1



APPENDIX 2: WAASM assessor report details of adverse events and areas of concern (2002–2009)

Table A2.1 Details of adverse events and areas of concern as reported by assessors in 630 of 5402 cases reported to WAASM (2002–2009)

Related to Open Surgery (n=123)	No.
Anastomotic leak after open surgery	56
Post operative bleeding after open surgery	18
Related to open surgery	16
Complication of open surgery	12
Injury to organ during surgery	7
Extension of ischaemia after open surgery	4
Intra operative bleeding during open surgery	3
Wound dehiscence after open surgery	2
High intracranial pressure following open surgery	1
Air embolism after surgery	1
Post operative obstruction after surgery	1
Bowel infarction after open vascular operation	1
Wound infection after open surgery	1
Delays (n=116)	No.
Delay to surgery	36
Delay in diagnosis	20
Delay in transfer to surgical unit	13
Delay in transfer to tertiary hospital	8
Delay starting DVT prophylaxis	7
Delay in recognising complication	7
Delay in transfer to surgeon by physician	4
Delay starting medical treatment	4
Delay to endoscopic retrograde cholangiopancreatography	3
Delay in surgery due to missed diagnosis	3
Delay to surgery whilst obtaining a computed tomography scan	2
Delay to blood transfusion	2
Delay in recognising a bleeding complication	2
Delay in transferring patient to ICU	1
Delay to starting ventilation	1



Delay in recognising an anastomotic leak	1
Delay in transfer to surgeon by general practitioner	1
Delay starting antibiotics	1

General complications (n=86)	No.
Aspiration pneumonia	24
Septicaemia	20
Pulmonary embolus	13
Cerebrovascular accident	5
Wound skin necrosis	5
Wound dehiscence	4
Peri-operative intracranial infection	3
Postoperative intracranial haematoma	3
Abdominal abscess	2
Postoperative bleeding due to coagulation	2
Renal failure	1
Wound infection	1
Postoperative pancreatitis	1
Fasciitis	1
Liver failure	1

Incorrect or inappropriate therapy (n=76)	No.
Decision to operate	20
Fluid balance unsatisfactory	10
Better to have done different operation or procedure	10
Unsatisfactory medical management	7
Wrong surgical approach used	3
Operation should not have been done or was unnecessary	3
Operation would have been better delayed	3
Postoperative care unsatisfactory	3
Better not to have treated laparoscopically	2
Duration of operation too long	2
Incorrect or inappropriate therapy	2
Operation should have been done	2
Better to have had more extensive surgery	2



More aggressive treatment of infection needed	2
Tracheotomy problems	1
Operation following recent cessation of anticoagulation drug	1
Over transfusion of blood	1
Too early removal of nasogastric tube	1
Wrong operation performed	1

Failure to use facilities (n=48)	No.
Failure to use DVT prophylaxis	25
Failure to use high dependency unit	9
Failure to use intensive care unit	7
Failure to obtain post-mortem	3
Failure to use antibiotic prophylaxis	2
Failure to use drug for treatment or prophylaxis	2

Patient related factors (n=30)	No.
Injury caused by fall in hospital	24
Patient refused treatment	4
Patient related factors	2

Drug-related problems (n=21)	No.
Over anticoagulation	6
Drug-related complication	4
Anticoagulation causing postoperative bleeding	4
Under anticoagulation	3
Reaction to drugs	2
Wrong drug used	1
Anaphylactic shock related to drug treatment	1

Problems related to diagnosis (n=21)	No.
Diagnosis missed by medical unit	7
Diagnosis missed by surgeons	6
Diagnosis missed by radiologist	3
Diagnosis missed by referring hospital	3
Diagnosis missed by unspecified	2



Related to endoscopic surgery (n=18)	No.
Related to endoscopic surgery	11
Perforation of duodenum during endoscopic operation	4
Bladder complication of endoscopic operation	1
Injury to duodenum during endoscopic operation	1
Operation-induced acute pancreatitis after endoscopic operation	1

Communication failures (n=16)	No.
Poor documentation	7
Communication failures	5
Poor communication between physician and surgeon	2
No protocol for DVT prophylaxis	2
Poor communication in emergency department	1
Failure in communication between x-ray department and clinicians	1

Assessment problems (n=12)	No.
Pre-operative assessment inadequate	11
Failure to investigate or assess adequately	3
Failure to recognise severity of illness	1
Assessment problems	1

Related to Fluid Balance (n=10)	No.
Post operative fluid balance unsatisfactory	4
Fluid overload	3
Post operative fluid overload	3

Related to laparoscopic surgery (n=9)	No.
Anastomotic leak related to laparoscopic operation	6
Arterial bleeding after laparoscopic operation	1
Fistula from duodenum after laparoscopic operation	1
Extension of ischaemia after laparoscopic operation	1



Staff problems (n=8)	No.
Surgeon too junior	4
Failure of junior surgeon to seek advice	1
Fatigue of operating surgeon	1
Surgeon operating without speciality	1
Anaesthetist should have been involved in preparation and resuscitation	1

Related to radiological surgery (n=8)	No.
Radiological surgery organ related technical	2
Arterial bleeding after radiological operation	2
Bile leaking from liver after radiological operation	1
Gall bladder complication of radiological operation	1
Heart complication of radiological operation	1
Distal arterial embolism after radiological procedure	1

Related to anaesthesia (n=6)	No.
Pneumothorax complication general anaesthetic	2
Premature extubation	2
Technique not ideal during general anaesthetic	1
Intubation failed for general anaesthetic	1

Transfer problems (n=5)	No.
Transfer should not have occurred	2
Problems during transfer	1
Transfer necessary due to bed shortage	1
Transfer necessary to obtain ITU bed no ITU in hospital	1

Resuscitation problems (n=4)	No.
Resuscitation inadequate	3
Fluid and electrolyte resuscitation inadequate	1

Problems with blood or blood products (n=4)	No.
Blood/blood products complication	2
No blood available	2



Monitoring problems (n=2)	No.
CVP insertion failed	1
Inadequate metabolic monitoring	1

Related to Equipment (n=1)	No.
Failure of equipment	1



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